WEST VIRGINIA GEOLOGICAL SURVEY

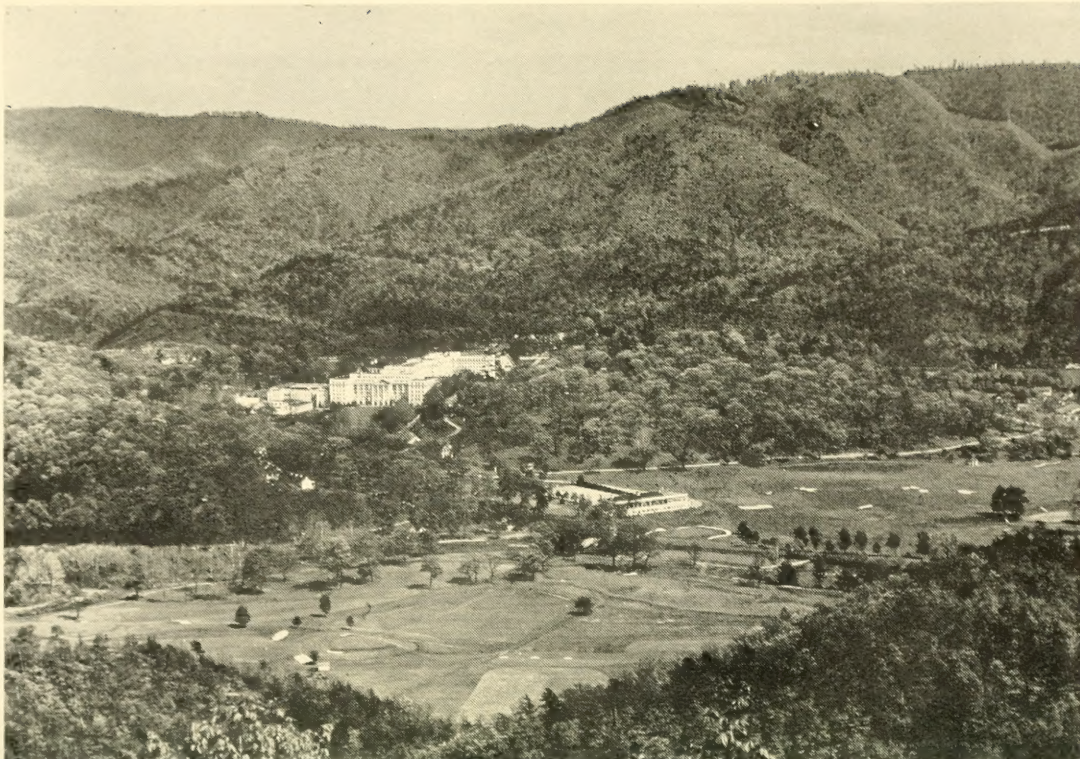

PLATE I.—View from side of Greenbrier Mountain, featuring the grounds of the White Sulphur Springs, Inc. One of the golf courses is shown in the foreground, the Casino and the Greenbrier Hotel in the center, and Kates Mountain with typical Devonian topography in the background. Photo. by Cummins.

WEST VIRGINIA

GEOLOGICAL SURVEY

Greenbrier County

By

PAUL H. PRICE, State Geologist

E. T. HECK, Assistant Geologist

1939

WHEELING NEWS LITHOGRAPH COMPANY
WHEELING, W. VA.
1939

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LETTER OF TRANSMITTAL

To His Excellency, Honorable Homer A. Holt, Governor of West Virginia, and President of the Geological Survey Commission.

SIR:

I have the honor and pleasure to transmit herewith for publication the Detailed Geologic Report and accompanying topographic and geologic maps covering Greenbrier County prepared by myself and E. T. Heck.

The county contains 1022.8 square miles of territory and is, therefore, the second largest in point of size in the State. Greenbrier County is rich in many ways including minerals, soils, timber, waters, climate, and especially her fine people. While other counties in the State may have fared better at the hands of Providence in some mineral resources certainly none has been more favorably blessed from the point of view of diversity of resources. The entire county was, before the coming of the white man, entirely covered with a fine growth of timber with hardwoods predominating. It is interesting to note that the forests of the county can be roughly divided into three districts just as can the geology, and is, of course, a reflection of the latter. The mountainous sections of the west and northwest are characterized by spruce, hemlock, and yellow birch and others that thrive at high altitudes, with hardwoods predominating below 3,000 feet. The main limestone section lying between the mountainous area and Greenbrier River produced excellent timber, most of which was hardwoods such as white oak, red oak, poplar, black walnut, hickory, and wild cherry. East of the Greenbrier River to the State line and especially along Anthony and Howard Creeks the predominating species was white pine.

In the western side of the county there is a wide zone of Carboniferous or Pennsylvanian rocks containing large reserves of New River and Pocahontas coals now in active development. West of the Greenbrier River and extending the entire length of the county is a wide belt of Mississippian rocks composed of thick limestones of the Greenbrier Series with overlying beds of red shale and shaly limestones of the Mauch Chunk Series. These rocks when weathered form certain soil types used most successfully for grazing and for cultivation of crops. The Greenbrier Series also affords an inexhaustible supply of limestone suitable for practically all purposes for which limestone may be used, i. e., industrial, chemical, and agricultural. Numerous quarries now operating attest their worth.

In the eastern part of the county, the rocks of Devonian and Silurian are not suitable for agriculture because of their generally siliceous nature but offer possibilities for iron ore and manganese both of which need further study. Sandstones suit-

able for building purposes and clays and shales adaptable to brick and tile manufacture are found throughout the county.

The mineral springs of the county represent one of its valuable resources and these together with its pure streams and agreeable climate have led to the development of the magnificent White Sulphur Springs resort area; the several boys and girls schools and summer camps; and the many fine summer homes which make Greenbrier County the most attractive vacation land in the country.

The field studies of the agricultural soils have been completed by a soil specialist of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture in cooperation with the West Virginia Geological Survey, and a report together with a soil map will be published in the near future. With its completion we will have a geologic, a topographic, and a soils map as well as a geologic and soils report on each county of the State.

It is especially fitting that this report is released under your administration as Governor since Greenbrier is your native county.

Respectfully submitted,

PAUL H. PRICE,
State Geologist.

Morgantown, W. Va., June 30, 1939.

CONTENTS

PART III. MINERAL RESOURCES.

ILLUSTRATIONS

Maps I and II in Atlas (Under Separate Cover).

Plates.

Figures.

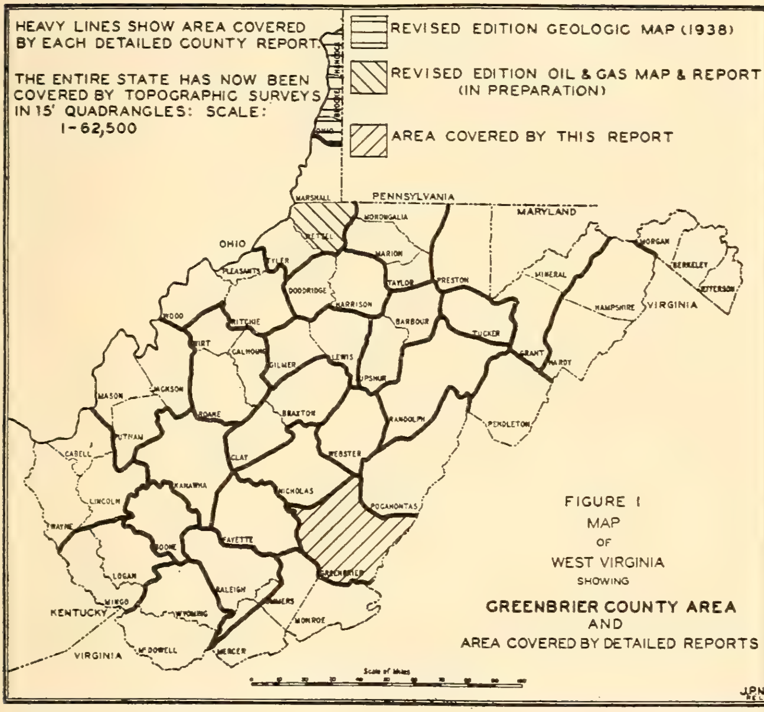
AUTHORS' PREFACE

This book is a general geologic and economic report on Greenbrier County, West Virginia. As shown in the Table of Contents, it contains a chapter on Historical and Industrial Development, a chapter on Physiography, seven chapters on Geologic History, Structure, and Stratigraphy, four chapters on Mineral Resources, and one chapter on Paleontology, as well as an Appendix giving all available spirit-level bench marks and railroad levels for the county.

In a separate Atlas, Maps I and II, respectively, show the topography and geology of the county. For these maps the topographic base was assembled and photolithographed from the standard topographic quadrangles as surveyed and published by the United States Geological Survey in cooperation with the West Virginia Geological Survey, with certain cultural corrections added by the authors. On this corrected base the geologic map was drawn.

The field work for this report was begun by Price in June, 1929, and continued by him during the summer months of 1930 and 1931. Price was assisted in the field during the summers of 1929 and 1930 by John P. Nolting, Jr. During the first half of the three summer months of 1931, Price was assisted by Charles W. Furbee, Jr. His assistant during the latter half was E. T. Heck. Lack of available funds caused virtual suspension of the work on this report during 1932, 1933, and 1934. The appointment of Price as State Geologist prevented his resuming field work on the report and the task of completing it was assigned to Heck in July, 1935. The field work was brought up to date, as of 1937, and completed by Heck under the direction of Price during the years of 1935, 1936, and 1937. Heck was assisted for short periods by Charles E. Hare and S. S. Galpin. The manuscript was completed in December, 1938. The chapter on Paleontology is the work of the late Dr. John L. Tilton and Professor Dana Wells, present cooperating Paleontologist. The chemical tests, except as otherwise specified in the text, were made by B. B. Kaplan and Homer A. Hoskins, Survey Chemists.

Including a portion of both the plateau and folded Appalachian regions, Greenbrier County offers a most interesting area for geologic study. The outcropping rocks, including those from the lower Silurian to the Kanawha Group of the Pennsylvanian, embrace a total of about 14,385 feet of strata and contain large quantities of coal, limestone, building stone, clays, iron ore, and some manganese ore. In addition, the area contains numerous mineral springs located in the midst of beautiful scenery and wonderful climate. A report of this



nature covering such a large area can always be improved as new information is brought to light. The present information on the area, however, appears sufficiently complete that new geologic discoveries other than those predicted in the text will probably be largely of a type that are of only academic interest. For example, a single fossil, *Leperditia elongata willsensis,* a variety reported by the Maryland Survey as occurring in the Wills Creek, has been found in the white quartzite making the small cave at Alvon, with identification by Wells, which would seem to indicate that the quartzite might not be Keefer (Clinton) but belongs in the Wills Creek Formation.

To Mr. R. C. Tucker the authors are indebted for editing, indexing, and piloting the book through the press. Practically every member of the Survey Staff had aided in some measure and special acknowledgment is made to Miss Irene Speicher for the laborious work of typing the manuscript.

It is impossible to make detailed mention of the many citizens of the county who most generously assisted the

writers while field work was in progress, but to all these general acknowledgment is here made. By way of exception, however, special acknowledgment is due to Mr. J. S. McWhorter, Mr. G. W. Watts, Mr. J. C. Kennedy, Mr. L. G. Swing, Mr. W. W. Coleman, Mr. J. W. Raine, Mr. B. L. Roberts, Mr. R. B. Holt, Mr. H. H. Blackburn, and Mr. F. W. Tuckwiller whose extraordinary interest in mineral matters and whose wide knowledge of many interesting outcrops and exposures have materially added to the value of the report.

PAUL H. PRICE.
E. T. HECK.

Morgantown, W. Va., December 15, 1938.

ERRATA.

Page 12, line 2 from top, for **Division**, read **District**.
Page 27, line 17 from bottom, for **Costal**, read **Coastal**.
Page 28, Reverse figure. Top is on binding edge.
Page 36, line 17 from bottom, for **channel**, read **channels**.
Page 39, first line of table, for **source to**, read **source of**.
Page 42, line 11 of table, for **Preaser Branch**, read **Peaser Branch**.
Page 44, line 13 of table, for **Bear Run**, read **Bear Branch**.
Page 45, line 14 of table, for **Old Knob Branch**, read **Job Knob Branch**.
Page 76, transfer heading to part of table above years 1922-23.
Page 115, line 12 from top, for **subferraneus**, read **subterraneus**.
Page 116, line 13 from bottom, for **bettles**, read **beetles**.
Page 155, line 11 from top, for **basel**, read **basal**.
Page 188, line 26 from bottom, add **Section** after **Renick Station**.
Page 204, lines 11 and 12 from bottom, for **Rensselaria**, read **Rensselaeria**.
Pages 210 and 211, for **Renick**, read **Renick Station**.
Pages 210 and 211, for **Renick Valley**, read **Renicks Valley**.
Page 229, line 14 from bottom, for **number**, read **member**.

PART I.

History and Physiography.

CHAPTER I.

HISTORICAL AND INDUSTRIAL DEVELOPMENT.

LOCATION.

Greenbrier County, the territory comprising this report, is the second largest county in the State, and is one of the counties bordering on Virginia, situated in the southeastern part of the State. It is included between the parallels of 37° 41′ and 38° 16′ north latitude and the meridians of 79° 58′ and 80° 50′ west longitude from Greenwich. Although it is quite irregular in outline it is roughly pentagonal. A line projecting north and south through its greatest extremity, or a distance of 41 miles, will roughly bisect it. Its greatest width from east to west is 51 miles along a line somewhat north of center. It is bounded on the north by Nicholas, Webster, and Pocahontas Counties, West Virginia; on the east by Bath and Alleghany Counties, Virginia; on the south by Monroe and Summers Counties, West Virginia; and on the west by Summers, Fayette, and Nicholas Counties, West Virginia. More than half the county, on the eastern side, is drained by the Greenbrier River and its tributaries, while the western side is drained by Meadow River and tributaries of the Gauley and Cherry Rivers, all of which go into the Kanawha River and ultimately the Gulf of Mexico.

The geographical position of the county is shown on Figure 1 in this volume, and in more detail on Maps I and II, accompanying the report in a separate Atlas.

GENERAL DESCRIPTION.

MISCELLANEOUS ITEMS.

Formation.—Greenbrier County, the second largest in the State, was established by act of the Virginia General Assembly, passed January 12, 1778, from parts of Montgomery and Botetourt Counties. Greenbrier is the mother of counties of southern West Virginia as was Monongalia in the northern part of the State. From its original territory Cabell, Kanawha, Mason, Monroe, Nicholas, Webster, Jackson, Wayne, Boone, Putnam, and Roane Counties have been taken.

The county is divided into ten magisterial districts as follows: Anthony Creek, Blue Sulphur, Falling Springs, Fort Springs, Frankford, Irish Corner, Lewisburg, Meadow Bluff, White Sulphur, and Williamsburg. The town of Lewisburg maintained an independent school district until the County Unit bill went into effect.

The county takes its name from the river which flows across it, but just how the river secured its name is still in doubt, although it is generally believed it derived its name from the greenbriers which grow in abundance in the river valley. The county was one of the earliest settled and is rich in historic interest. The present boundaries of Greenbrier County, as carefully surveyed by topographers of the United States Geological Survey, are delineated on Maps I and II, accompanying this report in a separate Atlas.

Area.—The area of Greenbrier County, as determined by planimeter from the topographic maps of the United States Geological Survey, surveyed in cooperation with the West Virginia Geological Survey is as follows:

Districts	Square Miles.
Anthony Creek	137.22
Blue Sulphur	91.71
Falling Springs	180.06
Fort Springs	34.38
Frankford	51.37
Irish Corner	45.53
Lewisburg	51.35
Meadow Bluff	216.20
White Sulphur	93.39
Williamsburg	121.59
Total for county	1022.80

Relief.—The topography of Greenbrier County is for the most part rugged and mountainous, the causes of which will be discussed in detail under the Chapter on Physiography. Greenbrier River and its tributaries flowing in a southward direction have highly dissected the eastern half of the county. Where resistant rocks were encountered steep precipitous cliffs have been formed. This is particularly true along the banks of the Greenbrier as well as Anthony and Howard Creeks where the latter streams have cut channels transverse to the trend of the mountains. The western side of the county is that of a highly dissected plateau with a general westward drainage of the dendritic type. These streams have cut steep precipitous V-shaped gorges through the more nearly horizontal rocks. The surface varies in elevation from 4372 feet at Grassy Knob at the junction of Old Field Mountain and Cold Knob Mountain in the north central part of the county to 1520 feet along Greenbrier River at a point where this stream leaves the county at the common corner of Greenbrier, Monroe, and Summers Counties one mile west of Alderson, making a total relief of 2852 feet. Other points standing above 4200 feet are: Cold Knob, 4345; Job Knob, 4338; Sugartree Bench, 4276; and Mikes Knob, 4243.

Climate.—From the standpoint of climate that of Greenbrier County, for the most part, is excellent. The winters are neither too long nor severe, and the summers are not unduly warm. July, the warmest month in the year, has an average temperature of 71°, while December and January, the two coldest months, average only 31° and 32°F. The popularity of this area as a summer resort attests to the fact that it is ideal for summer vacationing. Numerous camps for both boys and girls are located along Greenbrier River while many summer homes and cottages are to be found in the vicinity of Lewisburg and White Sulphur Springs.

The following statistics concerning temperature, precipitation, snowfall, and frosts were furnished by United States Weather Bureau, Parkersburg, West Virginia:

Monthly, Annual, and Mean Temperature in Degrees Fahrenheit at Lewisburg (El., 2250′).

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1900	......	......	......	......	[illegible]	[illegible]	[illegible]	73.8	69.9	58.8	45.2	[illegible]	......
1901	32.4	[illegible]	41.5	[illegible]	[illegible]	[illegible]	[illegible]	70.0	62.4	51.8	35.4	30.8	50.0
1902	28.8	[illegible]	41.3	47.4	[illegible]	[illegible]	[illegible]	69.0	62.0	54.8	48.8	32.9	51.0
1903	29.9	[illegible]	49.2	48.8	[illegible]	63.0	71.1	70.6	63.1	52.4	36.8	26.4	50.6
1904	28.4	[illegible]	43.2	47.1	[illegible]	68.2	[illegible]	[illegible]	65.0	51.8	37.6	32.2	50.1
1905	27.8	[illegible]	46.6	52.0	[illegible]	[illegible]	[illegible]	[illegible]	64.2	52.6	41.0	35.2	51.6
[illegible]	37.6	[illegible]	37.8	53.0	[illegible]	[illegible]	[illegible]	74.2	68.2	[illegible]	[illegible]	[illegible]	53.1
1907	[illegible]	[illegible]	47.3	44.2	[illegible]	63.8	[illegible]	69.0	66.0	49.2	40.7	33.0	51.2
[illegible]	[illegible]	[illegible]	48.1	54.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	43.0	34.2	51.9
1909	35.8	39.8	40.4	52.4	[illegible]	[illegible]	[illegible]	69.2	62.2	49.0	47.4	29.0	52.1
1910	31.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	67.8	66.8	......	36.0	[illegible]	......
1911	36.4	38.8	39.9	47.6	[illegible]	[illegible]	[illegible]	72.0	67.8	56.1	39.0	37.8	53.2
1912	23.0	28.6	39.9	54.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40.3	35.2	50.7
1913	39.4	33.8	44.2	50.4	[illegible]	[illegible]	[illegible]	69.6	61.6	[illegible]	43.5	37.0	52.9
1914	34.2	29.6	35.8	51.2	[illegible]	[illegible]	[illegible]	69.8	61.2	[illegible]	40.8	29.1	50.8
[illegible]	30.2	37.7	33.4	52.8	[illegible]	[illegible]	[illegible]	68.0	65.2	[illegible]	43.6	30.8	51.0
1916	38.4	33.2	38.2	49.0	[illegible]	[illegible]	[illegible]	71.0	61.4	[illegible]	42.0	31.7	51.4
1917	34.6	32.2	42.4	51.8	[illegible]	[illegible]	[illegible]	69.2	62.0	[illegible]	39.1	22.1	49.2
1918	19.6	34.6	46.8	48.7	[illegible]	[illegible]	[illegible]	72.2	58.8	[illegible]	41.4	38.8	51.3
1919	[illegible]	[illegible]	44.0	50.8	[illegible]	[illegible]	[illegible]	67.8	63.2	[illegible]	44.1	31.0	52.4
1920	29.8	30.4	40.6	48.8	[illegible]	64.8	[illegible]	[illegible]	[illegible]	[illegible]	41.2	33.6	50.2
[illegible]	33.7	[illegible]	52.2	53.2	[illegible]	[illegible]	[illegible]	68.0	69.5	[illegible]	45.6	36.4	54.1
1922	29.3	37.4	44.6	53.6	[illegible]	68.8	[illegible]	66.8	65.2	54.6	41.6	36.9	52.7
1923	34.4	31.8	41.8	49.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	51.9
1924	29.8	31.4	38.4	49.7	[illegible]	67.6	[illegible]	69.5	59.3	52.4	42.8	[illegible]	[illegible]
1925	31.3	41.4	44.5	54.0	[illegible]	[illegible]	[illegible]	67.8	69.0	[illegible]	[illegible]	[illegible]	52.2
1926	30.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	39.2	33.8	51.2
1927	32.6	41.7	44.4	51.6	[illegible]	64.5	[illegible]	65.0	64.1	54.8	46.0	34.2	52.4
1928	33.2	35.2	42.0	48.6	[illegible]	64.5	[illegible]	71.3	59.2	54.6	42.2	34.8	51.1
1929	32.1	30.2	45.7	54.5	[illegible]	[illegible]	[illegible]	65.9	64.2	[illegible]	[illegible]	[illegible]	[illegible]
1930	34.6	30.4	40.6	52.2	[illegible]	[illegible]	[illegible]	68.0	68.6	50.2	40.8	29.6	52.2
[illegible]	......	......	......	......	[illegible]	71.1	[illegible]	......	......	54.9	50.8	......	......
1932	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	67.4	[illegible]	......	65.5	53.6	40.8	[illegible]	......
1933	38.1	33.8	40.3	51.3	[illegible]	[illegible]	[illegible]	[illegible]	69.3	[illegible]	[illegible]	[illegible]	53.4
1934	36.0	26.6	40.0	53.2	[illegible]	[illegible]	[illegible]	71.2	66.4	54.3	......	......	......
1935	......	......	[illegible]	......	[illegible]	....	......	......	......	......	......	......	......
[illegible]													
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Monthly, Annual, and Mean Temperature in Degrees Fahrenheit at White Sulphur Springs (El., 1914′).

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1895	....	....	....	....	....	68.7	69.0	72.6	68.7	46.0	....	....	....
1896	30.6	33.4	37.8	56.8	66.4	68.0	71.6	71.5	64.2	50.0	47.6	33.8	52.6
1897	29.6	36.2	48.1	50.5	54.7	68.2	75.9	72.6	63.0	....	....	....	....
1898	....	....	5.12	47.2	63.0	....	....	....	66.3	55.6	43.2	....	....
....	....	....	....	....	....	....	....	....	....	....	....	....	....
1915	....	....	....	....	....	64.4	68.4	67.6	65.0	55.4	44.2	31.0	....
1916	38.3	34.2	39.9	49.6	62.6	63.4	69.7	69.6	62.1	54.6	41.3	32.0	51.4
1917	36.2	32.7	44.0	52.9	53.6	66.8	70.6	69.5	62.6	49.7	40.5	24.8	50.3
1918	21.6	36.9	47.3	50.2	64.8	....	69.0	73.6	61.1	57.6	....	....	....
1919	....	....	....	....	....	....	....	....	....	....	....	....	....
1920	....	....	....	....	....	....	....	70.4	65.2	55.0	40.0	32.4	....
1921	31.9	36.6	55.4	54.0	60.0	70.5	74.5	69.0	69.6	53.2	46.3	37.6	54.9
1922	30.0	37.8	45.6	50.4	63.0	70.2	70.8	67.1	64.6	53.2	42.7	36.4	52.6
1923	33.3	31.2	41.9	51.0	60.2	70.0	71.0	70.5	66.1	50.1	40.5	39.2	52.1
1924	26.6	28.2	35.8	49.6	55.6	69.4	69.2	71.6	59.2	52.2	42.8	33.8	49.5
1925	30.4	40.8	43.0	55.8	58.4	73.0	72.8	70.8	70.2	48.2	39.0	31.8	52.8
1926	29.4	35.5	36.4	48.6	62.0	66.2	72.9	73.9	68.8	54.6	38.6	33.0	51.7
1927	33.6	42.0	45.5	52.2	63.4	67.7	73.4	68.3	67.8	56.2	46.2	33.8	54.1
1928	32.6	34.9	41.6	50.0	59.8	67.5	72.8	73.2	58.5	52.6	....	....	....
1929	30.7	30.1	46.4	54.2	60.6	66.0	70.4	67.1	63.1	48.8	40.2	34.4	51.0
1930	30.0	36.9	36.2	52.1	61.8	67.1	72.6	68.9	66.8	49.0	37.4	26.8	50.5
1931	30.3	33.2	35.0	50.4	59.0	68.6	75.6	69.6	67.6	54.0	47.4	37.4	52.3
1932	40.6	39.2	36.2	50.4	60.4	68.0	71.0	68.8	63.0	51.6	38.0	31.1	51.5
1933	36.6	31.4	38.6	50.0	64.4	68.2	70.0	68.9	67.0	50.4	38.2	36.3	51.7
1934	34.1	27.9	41.8	52.8	66.9	75.2	77.5	72.0	67.2	55.8	48.8	31.6	54.3
1935	30.8	32.8	48.4	50.6	60.1	67.6	74.0	72.6	64.4	54.0	45.5	26.9	52.3
1936	26.6	30.2	45.0	49.5	62.3	69.4	73.6	73.0	66.2	56.1	40.6	33.0	52.1
Mean	31.6	34.4	42.8	51.3	61.0	68.4	72.0	70.5	65.1	52.7	42.3	32.9	52.1

Monthly, Annual, and Mean Precipitation in Inches at Lewisburg (El., 2250′).

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1900	2.22	3.44	4.86	1.16	2.43	2.96	4.00	1.68	4.59	4.80	6.60	2.34	41.17
1901	3.29	0.85	2.27	5.04	6.00	6.23	3.78	8.50	1.52	0.82	1.23	6.80	46.33
1902	8.52	3.20	3.77	2.28	2.38	4.33	0.96	1.68	1.92	1.93	3.09	3.94	38.06
1903	3.74	5.86	4.58	3.97	4.19	4.44	5.05	4.39	2.43	2.21	1.86	1.01	42.73
1904	1.83	2.37	2.83	2.62	5.23	4.95	2.75	2.65	1.37	0.65	1.38	3.27	31.90
1905	3.21	1.24	3.06	2.11	5.76	3.30	6.89	2.89	3.23	2.87	1.72	3.18	39.46
1906	5.18	1.21	4.70	2.60	3.30	4.40	4.87	3.79	3.73	2.86	3.08	3.18	42.90
1907	3.81	2.77	4.72	4.37	2.66	7.17	3.97	3.38	4.48	1.49	4.50	3.58	46.90
1908	3.03	2.22	5.62	4.37	5.45	3.26	6.77	5.09	0.51	3.11	1.96	3.35	44.75
1909	3.38	3.16	4.85	3.93	5.77	2.47	2.73	1.93	2.75	3.59	0.65	2.35	35.56
1910	3.91	2.09	0.62	3.71	2.29	6.05	4.69	3.77	3.01	1.18	1.53	2.18	35.03
1911	6.36	2.05	4.64	4.43	1.39	1.88	2.82	5.96	2.05	5.33	3.02	2.15	42.08
1912	2.17	1.41	6.37	4.21	3.43	4.21	3.64	1.21	4.03	1.87	1.76	2.78	37.09
1913	3.47	2.71	5.18	3.04	4.14	3.77	6.47	2.07	2.20	4.10	3.29	2.46	42.90
1914	3.96	4.71	3.55	3.70	[illegible]	1.44	4.74	3.26	1.49	3.57	0.99	5.30	37.67
1915	4.44	2.94	0.84	2.13	2.88	4.07	3.95	3.65	4.01	4.66	2.17	2.92	38.66
1916	3.38	3.57	2.71	3.13	2.43	5.55	2.88	4.74	4.01	1.76	1.58	2.30	38.04
1917	2.71	4.07	7.26	2.13	3.88	2.09	3.45	2.95	3.83	2.26	0.75	1.53	36.91
1918	4.89	2.15	5.08	5.97	1.96	7.41	4.42	5.81	2.87	4.99	1.50	3.72	50.75
1919	4.87	2.35	3.12	2.51	5.02	5.44	7.59	3.30	2.17	4.99	3.74	3.20	48.30
1920	3.45	2.44	3.35	5.61	2.50	4.88	3.96	5.08	3.30	0.34	4.70	2.07	41.62
1921	1.65	2.70	[illegible]	2.24	2.39	3.10	3.61	3.25	3.63	3.95	4.18	4.42	36.44
1922	2.69	3.46	5.51	3.23	4.28	4.52	3.01	4.67	1.78	2.74	0.61	0.04	42.28
1923	3.55	2.51	4.40	3.38	2.16	2.68	2.90	5.74	2.93	0.98	3.13	2.99	37.35
1924	4.05	3.99	2.58	2.85	5.05	2.54	3.09	6.03	4.49	1.05	2.51	[illegible]	40.29
1925	3.18	2.17	1.45	3.05	2.04	5.83	2.57	2.30	1.32	5.58	2.23	1.10	32.82
1926	3.98	2.77	2.48	2.18	1.85	1.27	3.13	6.61	2.09	7.46	2.10	6.26	42.18
1927	1.53	5.82	2.75	6.64	[illegible]	3.61	3.75	4.02	3.26	3.18	3.17	3.71	44.07
1928	1.79	1.57	2.56	3.19	2.91	5.45	4.11	5.98	3.74	2.03	2.00	1.35	35.78
1929	2.77	3.55	3.91	4.03	4.41	3.07	2.71	3.66	0.70	6.51	4.71	2.37	42.43
1930	1.63	2.25	1.04	1.65	1.94	1.17	3.01	1.09	0.34	0.95	1.61	2.18	18.88
1931	......	......	......	......	3.72	1.45	......	......	3.66	0.66	0.97	......	......
1932	1.24	.....	2.25	2.18	4.15	5.53	3.02	......	1.26	4.03	4.18	2.81	......
1933	3.52	4.10	3.80	2.80	5.72	1.87	7.26	4.10	1.30	0.78	1.35	2.54	39.20
1934	......	2.80	2.93	2.63	[illegible]	2.02	3.45	4.24	4.06	2.37	......	......	......
1935	......	......	9.57	......	[illegible]	......	......	......	......	......	......	......	......
1936	......	......	......	......	......	......	......	......	......	......	......	......	......
Mean	3.44	2.83	3.73	3.33	3.38	3.83	4.00	3.92	2.69	2.90	2.47	3.10	39.70

Monthly, Annual, and Mean Precipitation in Inches at White Sulphur Springs (El., 1914′).

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1895......	....	....	....	....	....	1.64	5.04	3.37	1.65	1.05	....	....	....
1896......	....	....	....	2.76	2.13	5.08	5.30	3.80	5.15	0.90	5.07	....	....
1897......	0.90	7.07	4.91	1.77	6.80	6.55	6.59	5.93	....	....	....	....	....
1898......	....	....	....	3.07	4.56	....	....	....	1.86	5.70	2.71	....	....
1915......	....	....	....	....	....	4.92	3.21	2.86	3.80	3.28	1.93	4.43	....
1916......	2.73	3.38	2.61	2.76	2.47	4.77	3.83	4.96	2.47	2.64	1.95	2.38	36.95
1917......	3.07	3.85	7.55	2.55	4.15	1.70	6.60	2.05	4.40	3.85	0.30	3.32	43.39
1918......	3.60	2.57	5.40	5.60	3.10	*7.25	4.80	2.65	2.40	4.65	*1.50	*3.50	47.02
1919......	....	....	....	....	....	....	....	....	....	....	....	....	....
1920......	....	....	....	....	....	....	....	3.63	3.32	0.50	3.44	2.15	....
1921......	2.88	2.55	0.83	3.50	3.29	2.22	4.09	4.91	7.02	2.58	2.53	2.55	38.95
1922......	1.64	2.09	3.65	1.53	3.34	4.88	4.16	2.69	1.78	1.76	0.52	6.52	34.46
1923......	4.82	3.73	3.13	2.99	2.04	2.83	2.99	3.15	4.79	1.23	2.60	1.30	35.60
1924......	0.62	1.86	2.62	2.69	5.94	4.00	3.45	7.37	4.93	1.25	1.24	3.63	39.60
1925......	3.70	1.56	1.54	2.76	2.20	5.26	1.61	0.91	1.92	3.78	2.86	3.42	31.54
1926......	5.52	1.48	2.47	1.67	2.86	0.90	3.26	5.01	1.71	6.59	2.36	5.45	39.28
1927......	1.72	6.23	1.21	5.55	2.29	3.58	3.44	2.92	2.13	3.70	3.27	3.16	39.22
1928......	2.12	1.15	2.51	3.07	1.99	4.36	3.40	4.54	6.15	2.05	1.90	1.55	34.79
1929......	2.00	1.97	3.70	3.85	3.70	3.20	2.50	2.60	0.80	5.20	3.90	1.33	34.75
1930......	1.37	1.55	1.20	1.70	2.25	0.90	1.30	1.20	0.45	0.80	1.71	1.45	15.88
1931......	0.95	2.00	2.05	3.15	5.35	1.55	4.30	4.25	3.15	1.10	1.25	4.45	33.55
1932......	3.20	3.35	4.35	3.99	3.15	4.95	2.70	2.00	2.00	4.10	3.20	2.88	39.87
1933......	3.10	4.55	4.40	3.17	4.85	1.15	5.80	2.80	1.05	1.05	1.45	2.45	35.82
1934......	1.85	*3.00	6.20	2.45	1.75	2.50	5.15	4.60	5.10	2.10	5.25	2.87	42.82
1935......	5.02	2.10	8.25	3.45	3.95	4.45	8.40	3.25	4.20	1.25	4.50	2.79	51.61
1936......	5.55	4.00	5.35	2.75	1.25	2.50	3.05	2.41	1.80	2.80	0.75	2.60	34.81
†Mean....	2.92	2.79	3.63	3.11	3.15	3.31	3.94	3.43	3.08	2.65	2.32	2.99	37.36

*Partly interpolated.
†1916-1918 and 1921-1936, inclusive.

Monthly, Annual, and Mean Snowfall in Inches at Lewisburg (El., 2250′).

Year	Jan.	Feb.	Mar.	Apr.	May	Oct.	Nov.	Dec.	Annual
1901	9.9	1.0	0.5	4.5	....	....	0.2	2.2	18.3
1902	8.2	3.2	7.2	5.0	....	T	....	....	....
1903	10.5	5.0	T	T	....	T	4.0	3.0	22.5
1904	9.0	8.2	T	T	....	T	6.0	4.0	....
1905	14.0	9.7	....	1.3	....	....	T	3.0	....
1906	T	7.0	10.0	T	T	1.8	2.8	1.5	23.1
1907	1.2	14.8	6.0	2.0	....	T	T	5.0	29.0
1908	13.2	17.0	2.5	T	0.5	....	9.0	13.2	55.4
1909	5.0	4.5	7.5	0.2	....	....	T	4.5	21.7
1910	6.2	4.5	1.8	T	T	T	T	8.2	20.7
1911	7.5	1.0	7.0	....	....	....	T	T	15.5
1912	12.0	4.0	12.0	T	....	....	1.5	3.0	32.5
1913	7.0	5.0	T	....	....	T	5.0	0.5	17.5
1914	16.5	26.5	18.5	T	....	T	1.0	17.5	80.0
1915	9.5	0.5	6.0	....	....	....	0.5	5.5	22.0
1916	11.0	5.5	7.0	10.0	....	....	....	9.0	42.5
1917	3.5	2.0	T	T	....	T	T	14.0	19.5
1918	25.5	3.0	....	6.0	....	....	....	0.2	34.7
1919	5.0	2.5	T	....	....	....	T	1.0	8.5
1920	1.0	9.0	T	....	....	T	3.0	2.0	15.0
1921	16.5	7.0	....	T	....	T	T	3.0	26.5
1922	14.0	15.5	3.0	....	....	....	2.0	T	34.5
1923	1.5	6.0	T	....	....	T	T	2.0	9.5
1924	2.0	16.5	1.0	....	....	....	4.0	T	30.5
1925	7.5	1.0	T	T	....	4.0	T	T	12.5
1926	5.5	7.0	8.5	4.5	....	T	T	1.5	28.5
1927	3.5	2.5	13.0	....	....	....	T	2.0	22.0
1928	0.5	T	8.0	8.5	....	....	T	1.5	15.5
1929	5.0	13.5	2.0	T	....	....	4.0	10.5	35.0
1930	11.5	2.0	2.0	T	....	....	4.0	9.5	29.0
Mean	8.1	6.8	4.3	1.4	T	0.2	1.6	4.4	26.8

T—Trace.
No snowfall reported for June, July, August, and September.

Monthly, Annual, and Mean Snowfall in Inches at White Sulphur Springs (El., 1914′).

Year	Jan.	Feb.	Mar.	Apr.	May	Oct.	Nov.	Dec.	Annual
1915	....	....	....	....	....	....	T	7.0	....
1916	1.0	5.5	9.0	8.0	....	....	T	11.0	34.5
1917	2.0	2.0	T	T	....	4.0	T	25.0	33.0
1918	27.0	2.0	....	16.0	....	....	....	....	....
1920	....	....	....	....	....	....	0.5	2.5	....
1921	20.0	5.0	....	T	....	....	T	....	....
1922	17.0	16.0	....	1.5	....	....	....	2.4	....
1923	6.2	5.0	....	....	1.0	....	....	....	....
1924	....	6.0	6.8	....	....	....	4.0	3.0	....
1925	....	4.0	T	....	....	....	....	....	....
1926	7.2	4.4	3.6	2.0	....	....	....	....	17.2
1927	3.5	6.0	2.5	....	....	....	....	T	12.0
1928	....	....	9.8	5.0	....	....	....	....	....
1929	....	13.5	....	....	....	....	....	....	....
1930	11.5	....	....	....	....	....	....	....	....
1931	....	....	....	....	....	....	....	T	....
Mean	10.6	6.3	3.2	3.1	0.1	0.6	0.6	6.4	30.9

T—Trace.
No snowfall reported for June, July, August, or September.

Killing Frosts.

	Lewisburg (El., 2250').		White Sulphur Springs (El., 1914')	
Year	Last in Spring	First in Autumn	Last in Spring	First in Autumn
1931	....	Sept. 30	May 9	Oct. 17
1932	May 3	Sept. 25	May 29	Oct. 6
1933	April 27	Oct. 26	April 28	Oct. 19
1934	April 27	Oct. 13	April 28	Oct. 14
1935	....	....	April 17	Sept. 30
1936	....	Oct. 28	May 14	Oct. 28
Average	April 29	Oct. 6	May 6	Oct. 14

Products.—Greenbrier County is fortunate in being able to boast of a diversified list of products of natural wealth. It may justly claim to be a coal mining, a lumbering, an agricultural, or a resort and mineral spring county. Few other counties in the State can offer so great a variety.

A broad limestone belt crossing the center of the county from north to south furnishes excellent agricultural land. The western side of the county produced over 2,000,000 tons of coal during 1930 with a value of over $3,000,000. Valuable growths of timber, both hard and soft woods, are found throughout the county with large acreages on both the east and west sides. The county is the most popular resort area in the State, both for resort hotels and summer camps in conjunction with several valuable mineral springs. Numerous limestone quarries are found throughout the limestone belt that can furnish limestone for any purpose.

The products will be treated in more detail under their respective headings.

The principal crops in Greenbrier in order of their importance are hay, corn, wheat, oats, Irish potatoes, barley, and buckwheat.

The principal animal products in order of their importance are cattle, sheep, horses, hogs, chickens, and turkeys. Dairy products (included under cattle) are a very important resource in this county.

Property Valuation.—According to the State Tax Commissioner the following table shows the property valuation for Greenbrier County for the years 1929 to 1936, inclusive:

Assessed Value of Real Estate, Personal Property and Public Utility Property in Greenbrier County, Taxes Levied and the Total Average Rate of Levy, for the Years 1929 to 1936, Inclusive.

Year	Assessed Value of Property				Taxes Levied				Total Average Rate of Levy on the $100 Valuation
	Real Estate	Personal Property	Public Utility Property	Total	On Real Estate	On Personal Property	On Public Utility Property	On Total	
1929	$16,575,280	$5,239,300	$ 7,845,092	$29,659,672	$521,815	$175,435	$245,895	$943,145	$3.18
1930	16,546,560	5,004,765	9,732,345	31,283,670	508,031	163,574	290,961	962,566	3.08
1931	8,631,910	4,116,615	9,718,115	22,466,640	331,290	165,298	326,266	822,854	3.66
1932	8,514,910	3,260,470	9,701,397	21,476,777	318,417	126,271	305,531	750,219	3.49
1933	8,522,570	4,132,910	10,121,700	22,777,180	149,864	61,294	203,562	414,720	1.82
1934	8,513,605	4,016,562	10,134,000	22,664,167	150,556	60,776	202,077	413,409	1.82
1935	8,531,590	4,133,100	10,189,600	22,854,290	143,488	59,428	196,218	399,134	1.75
1936	8,320,455	4,330,685	10,147,300	22,798,440	135,569	62,322	190,354	388,245	1.70

Postal Service.—Greenbrier County is served partly by railway and bus transportation of mails and partly by rural routes. The following table compiled from the United States Official Postal Guide for 1936, shows the number of post-offices in the county. The figures following the letters R, P, and S after an office indicate the following, as of April 1, 1936: R, boxes on rural routes emanating therefrom; P, post-office boxes at offices not having city letter-carrier service; S, boxes on star routes emanating therefrom.

Alvon S44
Anjean P72
Anthony
Asbury S7
Auto S29
Bellburn P4
Bingham S3
Blaker Mills S7
Blue Sulphur Springs R65, S8
Caldwell P15, S110
Camp Alleghany
Charmco P7
Clearco
Clintonville S48
Cordova S27
Cornstalk S11
Crag
Crawley S20
Crichton P6
Dawson S14
Duo
East Rainelle P138
Esty S43
Fort Spring P22
Frankford P34, S52
Friars Hill S10
Grassy Meadows S7
Hughart S26
Kieffer S14
Lawn S1
Leonard S18
Leslie P52
Lewisburg R175, P335, S97
Marfrance P32
Maxwelton P3, S24
Meadow Bluff S20
Neola S41
Nutterville S22
Organ Cave S15
Quinwood P109, S78
Rainelle P159, S78
Renick P29, S215
Renicks Valley S12
Richlands S23
Ronceverte R156, P201, S5
Rupert S10
Russellville
Smoot S28
Spring Creek S15
Sunlight S6
Trout S11
Unus S100
Vago S35
Vale
White Sulphur Springs P213, S54
Williamsburg P30, S19

Alderson, P. O. in Monroe County, R125, P250, S100.

Population.—The following table, taken from the United States Census Returns for 1930, shows the population of Greenbrier County by districts for the last three enumerations:

Minor Civil Division	1930	1920	1910
Anthony Creek Division	1,050	1,224	1,164
Blue Sulphur District	3,339	3,871	3,382
Alderson town, total	1,458	1,401	1,252
In Greenbrier County	930	841	677
In Monroe County	528	560	575
Falling Springs District	2,735	2,752	5,689
Falling Springs town	355	263	270
Fort Springs District	3,720	3,585	3,443
Ronceverte city	2,254	2,319	2,157
Frankford District	2,078	1,966	....
Frankford town	140	110	102
Irish Corner District	2,420	1,947	1,846
Lewisburg District	3,022	2,403	2,558
Lewisburg town	1,293	1,202	803
Meadow Bluff District	11,540	3,928	2,688
East Rainelle town*	1,272	....	....
Marfrance town*	1,066	....	....
Rainelle town	920	566	....
White Sulphur District	3,693	2,837	1,609
White Sulphur Springs town	1,484	837	338
Williamsburg District	2,272	2,229	2,454
Williamsburg town	148	161	120
Totals for county	35,878	26,242	24,833

*East Rainelle town incorporated in 1921 and Marfrance town in 1926.

TOWNS AND INDUSTRIES.

LEWISBURG.

Lewisburg, the county-seat, stands on the site of old Fort Union, and was named in honor of General Andrew Lewis who was active in military operations in this vicinity in 1774. The town was established in October, 1782, but its settlement dates from the gathering of the frontier army in 1774. The town is located in a topographic depression, or limestone "sink" in the southeastern part of the county at the junction of two old and historic trails, namely, the Midland Trail or James River and Kanawha Turnpike (U. S. Route 60) traversing east and west, and the Seneca Trail (U. S. Route 219) traversing north and south. It is located in the midst of a beautiful and valuable agricultural community and is noted for its schools and fine homes. Here is located Greenbrier Military School, (R. O. T. C.), which ranks as one of the best military schools of the South, and which opened its doors as early as 1808 or

1809. On the opposite side of the town is located Greenbrier College for Women which dates its history back to 1812, and is the successor of Lewisburg Seminary, Lewisburg Female Institute, and Lewisburg Academy. The town is well supplied with churches and is represented by the Methodist, Presbyterian, and Episcopal as well as a church for the colored inhabitants. Because of its institutions of learning and churches Lewisburg had always been known as a town of culture. The United States bench mark at Lewisburg is 2084 feet above sea-level. Its population according to the 1930 Census was 1293.

RONCEVERTE.

Ronceverte was laid out in 1871 by Colonel Cecil Clay and incorporated in 1882. It was given the name of the French equivalent of Greenbrier (**Ronce**—brier, **vert**—green), the river along which it is situated. The town was a result of the construction of the Chesapeake and Ohio Railway. Its growth was largely determined by its timber industries, its convenient access to an excellent agricultural region and its location at the junction of the Greenbrier Division of the Chesapeake and Ohio with the main line of the railroad. It is now the largest town in Greenbrier County.

The town has two banks, with capital stock and resources of $1,500,000; one weekly newspaper; one theater; an armory; a concentration depot for receiving milk and cream from the neighboring dairies; and a large steam generating power unit of the Virginia Public Service Company.

The town is well supplied with elementary and high schools, as well as with nine churches.

The water system and filtration plant are municipally owned and operated.

A United States Government bench mark at Ronceverte is 1665 feet above sea-level. The population of Ronceverte according to the 1930 Census was 2254.

WHITE SULPHUR SPRINGS.

The town of White Sulphur Springs is located in the southeast part of the county in a wide valley cut by Howard Creek, a tributary of the Greenbrier River. It is 120 miles

east of Charleston on the Midland Trail (U. S. Route 60) and is served by the main line of the Chesapeake and Ohio Railway. The land upon which it is situated was originally patented to Nathan Carpenter, who built his cabin near the spring and removed his family to it in 1774. It was incorporated in 1910. The town is built largely around the famous White Sulphur Springs resort which furnishes employment for a large number of the inhabitants. Aside from numerous hotels and tourists' houses within the corporate limits numerous excellent summer homes are located within a few miles radius of the town. The Government has established one of its Federal Fish Hatcheries here. It is also local headquarters for the Labar Nursery that does a large business in West Virginia evergreens.

In 1930 the town had a population of 1484. Its elevation is 1917 feet above sea-level.

ALDERSON.

The town of Alderson is located along the Greenbrier River, being partly in Monroe and partly in Greenbrier, near their common corner with Summers County. The town as originally incorporated in 1890 included only that part situated in Monroe County, but in 1902 the charter was amended to include that portion of the town lying in Greenbrier County. The principal business section is on the Monroe side while its main residential section is on the Greenbrier side with the latter county having the largest number of inhabitants, 930 of a total of 1458, according to the 1930 Census.

The town is served by the main line of the Chesapeake and Ohio Railway. It is situated upon the flood-plain and terraces of the Greenbrier River with an elevation of 1555 feet above sea-level.

The Alderson Academy, a Baptist school, is located here but has recently (1932) been consolidated with Broaddus College at Philippi and will be removed to that place.

A Federal Industrial Institution for women is maintained on the Monroe side of the river. One of the several excellent summer camps (Camp Greenbrier) that are located along the Greenbrier River is located on the Greenbrier County side. The sales and general offices of the Acme Limestone Company are located here.

Aside from those already named the principal business consists of supplying the needs of the rich farming community that surrounds the town.

RAINELLE.

Rainelle is located on a broad terrace near the junction of Sewell Creek and Meadow River in the western side of Greenbrier County. It is primarily a lumber town and is situated in the midst of one of the finest hardwood lumber tracts in the State. The town was incorporated April 25, 1913, and was named in honor of John and T. W. Raine, pioneer lumber, railroad, and coal mine operators in this area. The town is almost entirely made up of employees of the Meadow River Lumber Company which boasts the finest and largest hardwood lumber mill in the country.

The town is supplied with well-equipped hotels, banks, schools, and churches. The growth of the town was simultaneous and in conjunction with the building of the Sewell Valley Railroad (now owned by the Chesapeake and Ohio) and the Meadow River Lumber Company plant.

The Midland Trail (U. S. Route 60) passes through Rainelle. The population of the town in 1930 was 920. The elevation near the center of the town is 2425 feet above sea-level.

EAST RAINELLE.

East Rainelle, formerly Sewell Valley, and separated from Rainelle proper only by Sewell Creek, was incorporated under its own charter in 1921. The town is made up largely of small business establishments along the Midland Trail, which bisects the town, that serve the immediate town and surrounding area.

In 1930 the town had a population of 1272.

MARFRANCE.

Marfrance, a coal-mining town, is located on the headwaters of Meadow Creek, a tributary of Meadow River on the western side of the county.

The town was incorporated in 1926 and according to the 1930 Census has a population of 1,066.

FALLING SPRINGS,

(Renick P. O. and Station).

Falling Springs or Renick Post-Office and Station is located sixteen miles north of Lewisburg, on the Greenbrier River, and is served by the Greenbrier Division of the Chesapeake and Ohio Railway and the Seneca Trail (State Route 24).

The town is supplied with a bank, an electric milling company, a limestone quarry, and several mercantile establisiments that furnish supplies for the immediately surrounding area.

The population according to the 1930 Census report was 355.

WILLIAMSBURG.

Williamsburg, a strictly agricultural village, surrounded by good farms, is located near the center of the county in a limestone area. A hard-surfaced road connects the town with the Midland Trail, but there are no railroad facilities. The town is supplied with good schools and churches.

The population in 1930 was 148.

Villages.—Other small villages with approximate populations are as follows: Frankford, 140; Neola, 125; Anthony, 50; Fort Spring, 150; Clintonville, 50; Rupert, 300; Quinwood, 500; Leslie, 200; Bellburn, 150; Anjean, 300; Duo, 100; Clearco, 150.

TRANSPORTATION

WATERWAYS.

Since the coming of railways in the county, waterways have played a very minor role. Prior to that time, however, the larger streams and particularly Greenbrier River were used to float logs to band mills that were set up at strategic points. The Greenbrier River was well suited for that purpose as it carries a considerable volume of water and has a fairly low gradient, averaging 7.7 feet fall per mile across the county, a distance of 55.6 miles.

Meadow River and Anthony Creek as well as the two forks of Cherry River were also possibly used in a minor way for

PLATE II.—Front view of Greenbrier Hotel at White Sulphur Springs. Photo. by Cummins.

PLATE III.—View of Howard Creek Valley from Kates Mountain, looking west toward Caldwell Water-gap in background cut in rapidly dipping Pocono and Chemung rocks. Photo. by Cummins.

PLATE IV.—View from U. S. Route 60 near Clintonville showing Mauch Chunk and Greenbrier topography. The cone-shaped Weaver Knob can be faintly seen in the background.

PLATE V.—View from U. S. Route 219, near Renick, showing Greenbrier Limestone topography with sink-holes.

rafting, but other than this the development of the county was due to methods of transportation other than waterways.

RAILROADS.

Chesapeake and Ohio—Main Line.

The construction of the Chesapeake and Ohio Railway into West Virginia in 1873 (to White Sulphur in 1869) was as important in the development of Greenbrier County in comparison as the construction of this road was to the development of the State as a whole. The main line extends from Fortress Monroe, Virginia, westward across Virginia, West Virginia, and other States. The line is now equipped with double tracks (completion of double track in tunnels, 1932) and is doing a large business in coal, general freight, and passenger service.

This railroad enters Greenbrier County at the Allegheny Tunnel on Allegheny Mountain at the Virginia State line one mile east of Tuckahoe and follows the drainage of Dry Creek to White Sulphur Springs; thence along Howard Creek to its junction with the Greenbrier River at Caldwell, thence following the river, excepting the two tunnels near Fort Spring, to a point near Alderson where it enters Monroe County.

As the corporate history of the Chesapeake and Ohio Railroad has already been published in one of the Survey Reports[1] it is not deemed advisable to reproduce it here, but because of the importance of the construction of this road into West Virginia the reader is here referred to it.

Chesapeake and Ohio—Greenbrier Division.

The Greenbrier Division is a branch from the main line at Whitcomb, this county, and extends entirely across it northward, following the Greenbrier River to its northern termination at Winterburn Station (Thornwood P. O.), Pocahontas County. At Durbin it connects with the Western Maryland Railroad. The construction of this branch began in 1899 and was completed to Winterburn in 1905. Inasmuch as the main line served only the southern end of the county the completion of the Greenbrier Division marked a new era in the pros-

[1]Mercer, Monroe, and Summers, 1926, pages 5-11.

perity of both Greenbrier and Pocahontas, the adjoining county to the north.

Nicholas, Fayette, and Greenbrier Railroad Company.

On December 30, 1931, the Sewell Valley Railroad Company, the Greenbrier and Eastern Railroad Company, and the Loop and Lookout Railroad Company were consolidated with the Nicholas, Fayette, and Greenbrier Railroad Company.

The following quotation from a letter from Mr. J. W. Raine, President of The Raine Lumber and Coal Company, summarizes the history of the Sewell Valley Railroad:

"Duo, W. Va., October 8, 1937.

"Father (T. W. Raine) began construction of the Sewell Valley Railroad at Meadow Creek the spring of 1908. It was completed to Rainelle in February 1910. In 1911 it was completed to the mouth of Burdette Creek. During 1916 it was extended to Nallen to serve the Wilderness Lumber Company. The branch from Rainelle to Rupert and Glencoe was begun in 1920 and completed 1922. The Big Clear Creek extension was begun 1927 and completed in 1929.

"The Sewell Valley Railroad was owned by The Meadow River Lumber Company from the beginning until July, 1921, when my father and brothers purchased it. They sold it to the Chesapeake and Ohio Railway Company in July 1927.

"Father (T. W. Raine) was not connected with the Greenbrier & Eastern. This was begun in 1920, I think, and was sold to the Chesapeake and Ohio about the same time that they bought Sewell Valley.

"The main traffic at the first was lumber and continued so until about 1920. From that time on coal business developed and now it is the principal traffic."

The following quotation from a letter from Mr. J. M. Raine, Assistant Superintendent of the Nicholas, Fayette, and Greenbrier Railroad Company, summarizes the corporate history of this company:

'Rainelle, W. Va., November 29, 1937.

"The original Nicholas, Fayette, and Greenbrier Railroad Company projected from Swiss, West Va., on the New York Central to Nallen, West Va., to the Loop & Lookout Railroad Company (Sewell Valley Railroad Co., Lessees). Construction started in February, 1929, and completed in October 1930—distance 28.2 miles, and the track was put into operation January 6, 1932.

"At the present time there is no traffic originating directly on this part of the road; however, it is a timber and coal area. Up to the present time no track has been abandoned by any of the railroads.

"The Chesapeake and Ohio Railway Company took over the operation of the Sewell Valley Railroad Company July 1, 1927, and the

operation of the Greenbrier & Eastern Railroad Company was consolidated with the Sewell Valley Railroad Company on March 1, 1928. On December 30, 1931, the Sewell Valley Railroad Company and the Loop and Lookout Railroad Company, and the Greenbrier & Eastern Railroad Company were consolidated with the Nicholas, Fayette, and Greenbrier Railroad Company as a single corporation, the charter of the first three named roads being surrendered to the State of West Virginia.

"On January 6, 1932, joint operation of the consolidated properties was established by the two roads owning the property. The Nicholas, Fayette and Greenbrier Railroad is now owned jointly by The Chesapeake & Ohio Railway Company and The New York Central Railroad Company, each owning one-half interest. The Sewell Valley and the Loop and Lookout Railroads were previously owned by Mr. T. W. Raine and his associates, who built these roads. The Greenbrier & Eastern Railroad Company was previously owned by Coal Companies or their representatives, who were located on this line."

As described in the above letters, the Nicholas, Fayette, and Greenbrier Railroad leaves the main line of the Chesapeake and Ohio Railroad Company at the town of Meadow Creek, Summers County, and follows Meadow Creek to Springdale, Fayette County. From there it follows Sewell Creek north to Bellwood, thence northeast to Rainelle and East Rainelle, Greenbrier County. From here a branch follows along Meadow River, eastward to Rupert, thence northward along Big Clear Creek to Anjean, Duo and its termination at Clearco. There is also a short branch from Rupert to Little Clear Creek and just below Anjean a branch logging road extends up Brown Creek. This line from Rainelle to Clearco, is used for transportation of logs to the Meadow River Lumber Company and provides an outlet for the coal from the mines at Midland, Anjean, Duo, and Clearco.

The branch of the Nicholas, Fayette, and Greenbrier Railroad that was formerly known as the Greenbrier and Eastern crosses Meadow River at East Rainelle and follows the north side of that stream to the mouth of Meadow Creek, thence northeast along Meadow Creek to Bellburn, Leslie, Crichton, Quinwood, and Marfrance. This branch is the outlet for the coal from the many commercial mines near the above-named towns.

The portion of this railroad along the southwest side of Meadow River from East Rainelle to Burdette Creek was constructed in 1911. At Burdette Creek the railroad crosses to the northeast side of Meadow River and follows along the river

to Russellville. Just north of the town the railroad crosses to the southwest side of Meadow River, following the river to Nallen, Fayette County. The part of the line from Burdette Creek to Nallen was constructed in 1916-17. This railroad between East Rainelle and Nallen was known as the Loop and Lookout Railroad previous to its consolidation with the Nicholas, Fayette, and Greenbrier Railroad. The branch railroads leaving the main line at Burdette Creek, extending up that creek, and along the south side of Meadow River, are logging roads.

The original Nicholas, Fayette, and Greenbrier Railroad connects with the Loop and Lookout at Nallen and follows Meadow River and Gauley River to Swiss, Nicholas County, crossing Gauley River from the south to the north side of the mouth of Peters Creek.

HIGHWAYS.

State Roads.

Road building in West Virginia has progressed rapidly since the legislative enactment of 1921 with the organizing of a State Road Commission, and following a definite plan of construction. In this road building program Greenbrier County has received its proportionate share of new roads. It is true that the county was traversed from both north to south and east to west by two well-established through routes, both of which, however, needed much improvement to meet the needs of modern traffic. These two routes, U. S. 60 and W. Va. 24, (now U. S. Route 219), have both been straightened, widened, and hard surfaced under the new program and are now a part of two of the most widely traveled routes in the State.

From the 1936 edition of the State Road Map, issued by the State Road Commission, and in conjunction with the more detailed topographic maps, the following descriptions of U. S. and State routes in Greenbrier County have been compiled. Their terminals in other counties or at the State line have been indicated.

U. S. Highway No. 60.—(James River and Kanawha Turnpike—Midland Trail).—The first important highway to be con-

structed in what is now Greenbrier County was the James River and Kanawha Turnpike. An early writer who traveled over the route pronounced it "one of the principal chains destined by nature to bind together the eastern and western portions of this great republic." The need for such a route was brought to the attention of the Virginia Assembly by Washington in 1784 and was promptly passed in an act incorporating the James River Company, and in 1785 authorized the construction of the "State Road" (for wagons) which was completed to the navigable waters of the Kanawha by 1790 and opened to the Ohio by 1800 (For a more complete history of this road see Callahan's Semi-Centennial History of West Virginia, 1913).

The present U. S. Highway No. 60 enters Greenbrier County from Virginia on Allegheny Mountain at a point four miles east of White Sulphur Springs. Passing through the latter town it follows the general course of the old turnpike, but with several rather important new locations, crosses the Greenbrier River to Lewisburg, continues west through Richlands, Clintonville, Rupert, Rainelle, and leaves the county to enter Fayette just west of Rainelle.

It continues west across Fayette, traversing rugged and beautiful scenery along the New River gorge to Charleston, thence on west to Huntington on the Ohio by way of Teays Valley.

This route is now one of the most important east and west highways and because of its scenic grandeur is very popular with tourists.

U. S. No. 219 (formerly State Route No. 24) or what is otherwise generally known as the **Seneca Trail**, is another important highway passing through Greenbrier that crosses the State from north to south. It enters West Virginia three miles south of Red House, Maryland, and continues southwest across West Virginia through Thomas, Parsons, Elkins, Huttonsville, Valley Head, Marlinton, and enters Greenbrier County on the south side of Droop Mountain. In Greenbrier it continues southwest generally paralleling the Greenbrier River through Renick, Frankford, and Maxwelton to Lewisburg where it crosses U. S. Route No. 60. From Lewisburg it continues south to Ronceverte where it crosses the Greenbrier River, and

leaving the general course of this river to continue south, enters Monroe County at Second Creek. From here it continues generally southwestward through Union, Peterstown, Princeton, and finally Bluefield at the Virginia State line. This route is now graded and paved throughout its entire length in West Virginia. It is one of the most scenic and picturesque highways in the State and is fast becoming a favorite with tourists.

State Route No. 54 is a short route connecting State Route No. 3 at Alderson with U. S. Route No. 60 at Alta. It lies entirely within the boundaries of Greenbrier County and is entirely paved.

State Route No. 3 lies within the limits of Greenbrier County for a distance of only about a mile, this being from Alderson to the Summers County line. This route, however, starts near Sweet Springs, Monroe County, coincides with U. S. Route No. 219 between Union and Pickaway, and proceeds westward across that county to Alderson; thence southwestward and westward to Hinton, Beckley, through a number of small towns in Raleigh, Boone, and Lincoln Counties to join State Route No. 10 at West Hamlin. This road is paved throughout except for a short distance between Woodville and Yawkey, Lincoln County.

State Route No. 44 originates on State Route No. 39 at Nettie, Nicholas County and proceeds southward entering Greenbrier County a few miles north of Quinwood, passing through that town. Continuing southward it joins U. S. Route No. 60 at Charmco and coincides with it through East Rainelle to Rainelle where it leaves U. S. Route No. 60. This route leaves Greenbrier about two and one-half miles southwest of Rainelle; thence southward to Hinton, to Athens and ends at its junction with U. S. Route 219 near Princeton, Mercer County. It is paved from Nettie to Rainelle and between Athens and its junction with U. S. Route No. 219 but is only graded or unimproved for the other 52 miles.

State Route No. 63 is a proposed road connecting Alderson and Ronceverte, wholly in Greenbrier County, that is partially graded.

State Route No. 39 starts at Summersville, Nicholas County, and proceeds to Richwood via Nettie and Fenwick. The proposed extension of this route crosses the northern end of Greenbrier County and connects Richwood, Nicholas County, to U. S. Route No. 219 at Mill Point. The extension is only partially graded.

The greater part of the remaining area is covered with a network of dirt roads, several miles of which are now paved. There remain, however, several areas, namely North and South Forks of Cherry River, Little Clear Creek, North Fork of Anthony Creek and Meadow Creek west of Allegheny Mountain, to which access is quite difficult.

AIRPORT.

Airport.—Air travel is just coming into prominence in West Virginia. The only commercial airport in Greenbrier County is located near White Sulphur Springs. The following information is reprinted from the State Road Commission Map:

> "White Sulphur Springs—1.5 mi. S. W. on U. S. Highway 60; 1 mi. S. W. of Greenbrier Hotel. Alt. 1,795. 5,000 by 2,000 turf; level. Pole line to N. W., woods to N., trees along creek to S. and W. Service day only."

RESORTS AND SUMMER CAMPS.

What is perhaps the most famous resort in the western hemisphere is located in Greenbrier County. With historic and social tradition reaching back for more than a century and a half, White Sulphur Springs has become one of the institutions of this county and it is visited by thousands each year.

The following quotation is taken from the West Virginia Encyclopedia, West Virginia Publishing Company, Charleston, W. Va., pp. 1005-6, 1929:

> "While the general public, perhaps, looks upon White Sulphur as a gathering place for the fashionable society of the country during the spring, summer, and fall seasons, its importance as a health-giving resort is not secondary. A superior thermal and medical equipment which provides for all forms of hydrotherapy, including such special baths as are given at Nauheim, Aix-les Bains, Carlsbad, Vichy, and other foreign spas, makes it compare favorably with any of the European cures, and there is no time of year when its baths and medical department are not greatly in demand.

"The bath establishment, instituted about fifteen years ago by the late Dr. George Kahlo, after an exhaustive study of the foreign cures, is the most complete and luxurious in its appointments of all institutions of its kind in the United States. Sulphur-water baths are a special feature.

"In general, it may be said that the White Sulphur Springs waters are of the highest value in conditions associated with impaired digestion, disturbed metabolism, and insufficient elimination. Conditions resulting from an accumulation of toxins, such as gout, rheumatism and arthritis, are acted upon favorably by the waters and treatment.

"Contributed to by both environment and tradition, the life at White Sulphur is probably equaled in charms at no other American resort. There are three splendid golf courses and several tennis courts. Several hundred miles of carefully laid-out mountain riding trails and a large stable of Virginia-bred and Kentucky-bred saddle horses lend variety to the sports life. There are good roads for motoring. Beautiful scenery[2] and clear, stimulating air at an altitude of nearly three thousand feet add to the attractions of the resort.

"The modern Greenbrier Hotel,[3] a beautiful Georgian structure standing in parklike grounds of several thousand acres and adjacent to the former site of the Old White Hotel, is charmingly situated in the valley of the Greenbrier River[4] at the base of the towering ridges of the Alleghenies as they sweep through the West Virginia country toward the Ohio Valley. Built about fifteen years ago, it is on a par with the finest hostelries in the large Eastern and Western cities. A large cottage colony surrounds the Greenbrier.

"The resort is pleasantly and comfortably reached by an over-night trip from nearly all the large Eastern and mid-Western cities."

There are many points of geological interest on and around the grounds of the resort. Every series of the Devonian outcrops on the resort grounds and much of the Mississippian and the Silurian are exposed at near-by points. There are numerous fossils to tempt the collector and jointing often leaves interestingly shaped rocks (see Plate XXXII). There are numerous illustrations of anticlines and synclines in the area, with the most striking example in the Anthony Creek gorge at Alvon. The Oriskany Sand, that is such a prolific producer of gas in Kanawha County, outcrops on Bobs Ridge, Coles Mountain, and on Beaverlick Mountain.

The geology of the springs of the resort is quite interesting, but description of these is reserved for Chapter XIII.

With an ideal climate, Greenbrier County, of course, has a number of summer camps. Camp Greenbrier, a scout camp,

[2]See Plate III and others in this report.

[3]See Plates I and II in this report.

[4]The resort is actually located in the valley of Howard Creek, which is tributary to Greenbrier River at Caldwell. Foot-note added.

Camp Alleghany, Camp Loopmount, and many others are located along the Greenbrier River.

Both the State and Federal governments have established forests and parks in the area adjacent to the Greenbrier-Pocahontas County line and each year the county becomes more and more popular with vacationists and tourists.

CHAPTER II.

PHYSIOGRAPHY.

INTRODUCTION.

In any area the present land surface, or the distribution of land forms, i. e., mountains and valleys, caverns, etc., is the result, or the expression, of the interaction of earth forces with those of the atmosphere, and represents the geologic history of the region during the time it has been a land area. The Appalachian System, of which the local area is a part, constitutes one of the oldest mountain chains of the earth, and still retains certain features that go back to the Tertiary or Cretaceous Age.

Greenbrier County lies near the source of several of the major streams of the eastern United States. In this area, as in any other area, the streams are the oldest surviving remnants, and represent by far the most important factor in the development of the present land outline. The character and position of the strata, upon which the land forms are developed, will influence and in part control their development. The rocks of Greenbrier County—sandstone, limestone, and shale—are all of sedimentary origin; that is, deposited from a transporting medium, generally in water of varying depths and salinity, while the coals represent abundant vegetation spread over a low-lying swamp area, but in sufficient water to prevent decomposition, which would follow if not arrested by the formation of a toxic acid that prevents bacterial decay.

Let us consider then for a moment the important events in the geologic history of the eastern United States that directly concern this area. Suffice it is to say that since all the strata found in this county are of sedimentary origin, the region must have been below the ancient sea-level to permit their formation, the sediments being carried by streams from an older crystalline area farther east. At the close of the deposition of the youngest rocks now found in the State (Permian), earth

movements acting as a thrust from the east caused the entire area to be strongly folded, with some faulting, and elevated above the level of the sea, then erosive agents went to work to reduce it. After sufficient time or during the early Tertiary[1] Period the entire eastern United States was reduced to a more or less even plain. The region was again elevated to be followed by erosive action with new vigor. This time the planation was not so complete except in the areas of the less resistant strata, but with mature dissection in the areas of the more resistant strata. The time of this leveling is attributed to late Tertiary. The whole has since been again uplifted and further dissection is now in progress.

The result of these respective influences is the development of similar land forms in regions where like factors have been equaly effective. These regions have been divided into physiographic provinces or subdivisions that show similar geologic histories. A map (Figure 2) has been prepared showing the position of Greenbrier County in the physiographic provinces of a portion of the eastern United States.

PHYSIOGRAPHIC PROVINCES.

The eastern United States has been divided into Physiographic provinces by Fenneman[2] from east to west as follows: (1) Continental Shelf, (2) Costal plain, (3) Piedmont Province, (4) Blue Ridge Province, (5) Valley and Ridge Province, and (6) Appalachian Plateau.

Portions of the latter four of these divisions are shown on Figure 2 and the boundary between the Appalachian Plateau and Valley and Ridge Province, in Greenbrier County is given in more detail on Figure 3. It will be noted that this boundary in Greenbrier County has been shifted some ten miles farther west than the division line given by Fenneman.[3]

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[1]The age of this erosion surface is subject to considerable discussion, but the consensus of opinion now seems to favor early Tertiary for planation and late Tertiary for the uplift.

[2]Fenneman, N. M. Map. Physical Divisions of the United States, 1916.

[3]Fenneman, N. M., "Physical Divisions of the United States," Map, compiled in cooperation with the Physiographic Committee of the U. S. Geological Survey, Edition of 1930.

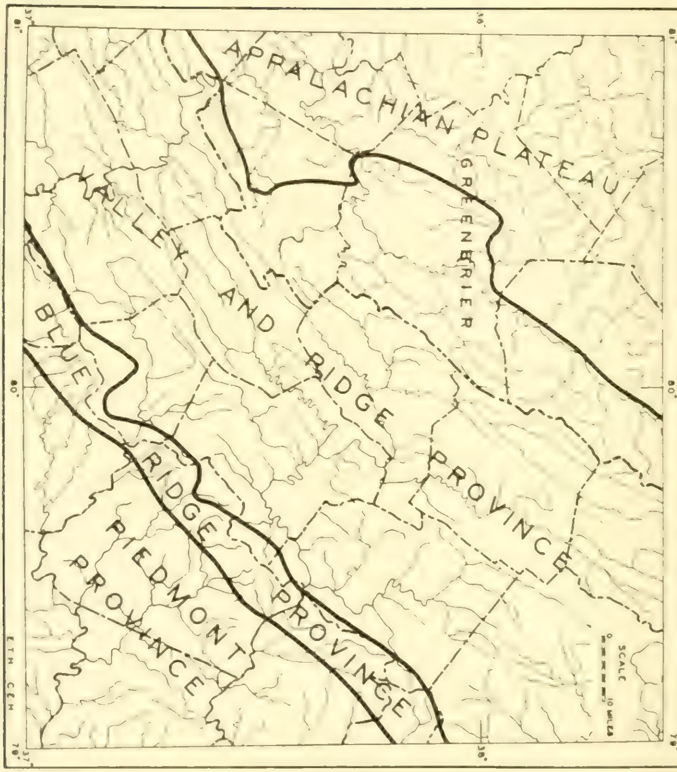

Figure 2.—Map showing the physiographic provinces in Greenbrier County and surrounding territory as modified after N. M. Fenneman.

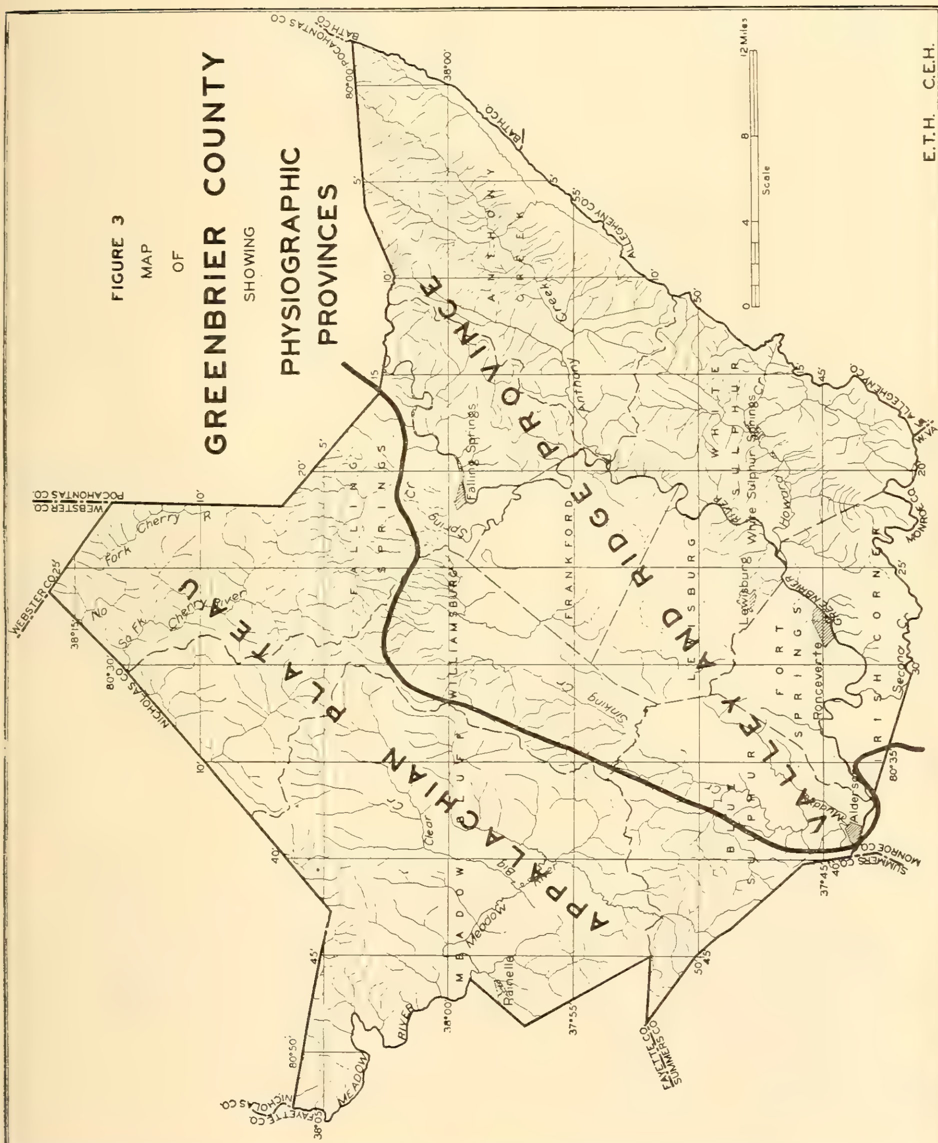
FIGURE 3
MAP
OF
GREENBRIER COUNTY
SHOWING
PHYSIOGRAPHIC
PROVINCES
APPALACHIAN PLATEAU
VALLEY AND RIDGE PROVINCE
ANTHONY CREEK
FALLING SPRINGS
WILLIAMSBURG
FRANKFORD
LEWISBURG
WHITE SULPHUR
FORT SPRINGS
IRISH CORNER
BLUE SULPHUR
MEADOW BLUFF
Falling Springs
White Sulphur Springs
Lewisburg
Ronceverte
Alderson
Rainelle
Scale
0 4 8 12 Miles
E.T.H. C.E.H.
POCAHONTAS CO.
WEBSTER CO.
NICHOLAS CO.
FAYETTE CO.
SUMMERS CO.
MONROE CO.
ALLEGHENY CO.
BATH CO.
W. VA.

The reasons for shifting this boundary to the west can be summarized as follows:

1. The presence of a strong anticline (Williamsburg).

2. The presence of an erosion scarp.

3. The change from a trellis to a dendritic drainage pattern.

4. The change from mountains having a general northeast trend to those with no regional trend.

The Valley and Ridge Province, generally includes a series of parallel ridges composed of resistant strata alternating with parallel valleys developed on non-resistant strata. In this county the folds are not so regular nor so severe as in the Ridge and Valley Province as a whole, and as a result the ridge and valley topography is not so well developed as in other parts of the province. Greenbrier River, which has developed the largest valley of the area, in general, parallels the strike of the rocks, but has entrenched itself, with many tortuous meanders, through and over rocks that can well be called resistant to erosion. The trellis or rectilinear pattern of stream drainage is well developed in that part of the county east of the boundary shown in Figure 3. This fact is partially obscured west of the Greenbrier River by subsurface drainage on the Greenbrier Limestone, but is readily apparent in the vicinity of Brushy Ridge.

The western part of the county lies within the Appalachian Plateau Province and presents a different drainage pattern as well as different land forms. Here the mountains attain their highest elevation, (over 4,000 feet A. T.) and their forms are the results of dissection by streams, that have cut deep V-shaped gorges into the elevated plateau. It should be noted that the slope of the ridges and mountain summits is to the northwest, and that the regional dip is also in that direction. In this part of the county the streams have been only slightly controlled by the structure of the rocks and a dendritic (more properly an insequent) drainage pattern has been developed.

THE EARLIEST RESTORED SURFACE.

Figures 4 and 5 show the difficulty of recognizing any of the older erosion surfaces described in other publications on the physiography of the Appalachian region. In 1925 Wright[4] described and contoured the "Upland (Schooley) Peneplane" for part of Virginia and West Virginia, including Greenbrier County. In that report the "surface" represented by the northwest sloping ridges and mountain summits of the plateau region are correlated with the "surface" represented by ridge tops east of the Greenbrier River. An examination of Figure 5 offers serious objection to such a correlation. In making this correlation Wright postulated that the greatest uplift occurred a short distance northwest of the present erosion scarp and several local domes are mapped along this line.

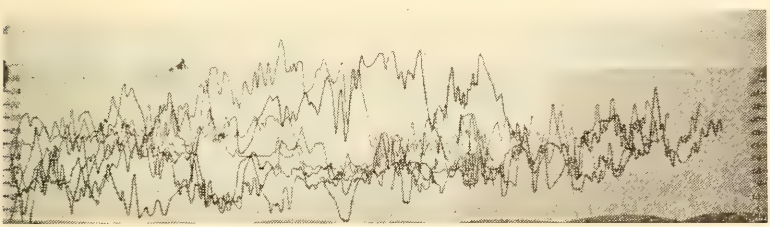

Figure 4.—Seven profiles drawn on glass, along the five-minute latitude lines across Greenbrier County. Originals drawn by John P. Nolting. Vertical exaggeration x 26.

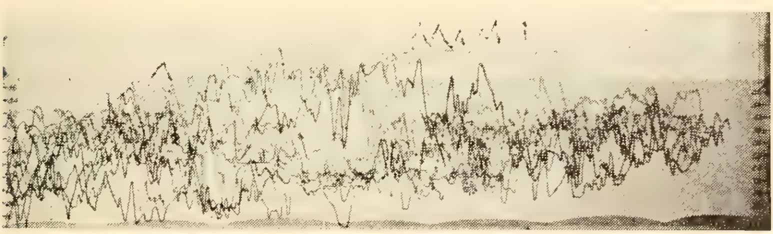

Figure 5.—Same as Figure 4, with superimposed projected profiles. Originals drawn by John P. Nolting. Vertical exaggeration x 26.

[4]Frank J. Wright, "The Physiography of the Upper James River Basin in Virginia," Bulletin No. XI, Virginia Geological Survey, 1925.

Warping of the magnitude postulated by Wright[5], should be shown by anomalies in structure and it will be noted on Map II (in Atlas) that there is a structural dome in the vicinity of Grassy and Cold Knobs. A distinct synclinal saddle separates this structural dome from the northern end of the Williamsburg Anticline and it appears likely that the dome has a different structural origin than the anticline to the east. Cold Knob (4345′ L) Grassy Knob (4372′ L) and Job Knob (4338′ L) are at nearly the same present elevation, while, structurally, Cold Knob (near the top of the dome) is 1000 feet higher than Job Knob and 300 feet higher than Grassy Knob. About 400 to 500 feet of the difference in the structural elevation between Cold Knob and Job Knob may be attributed to the formation of this dome. It appears, therefore, that this structural dome must have been in existence before the formation of the oldest peneplain surface represented in Greenbrier County.

There are no structural irregularities that can be correlated with the warping of the "Upland Peneplane" as shown on Wright's[6] map. It appears that Wright has contoured the average elevations of the ridge tops in Greenbrier County, but whether or not these average elevations represent one peneplain is seriously questioned.

The absence of a relatively flat and clearly defined Schooley Peneplain in Greenbrier County may be accounted for by one or more of the following hypotheses:

1. During post-Schooley uplift, the surface was subjected to complex warping. This theory has been discussed above.

2. The peneplain surface has been destroyed by post-Schooley erosion. In support of this theory it is noted that the total available relief, in Greenbrier County, of over 2500 feet, which is greater than the elevation of the Schooley in many places, would cause erosion to proceed at a rapid pace. This hypothesis would require two assumptions; (a) complete or nearly complete Schooley planation of the region; (b) that the region in question be at or near the point of greatest uplift. Both of these assumptions are plausible but unproved.

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[5]Op. cit.
[6]Op. cit.

3. Wasting of the Schooley surface with greater reduction on the softer and/or the more steeply dipping rocks has resulted in an uneven and poorly defined level. Wasting and reduction of a peneplain, with or without loss of its horizontality, has been advocated by Hayes[7], Fenneman[8], Wright[9], and Ashley[10]. Each writer suggests that the reduction of the Schooley Peneplain in some places may be measurable in hundreds of feet. This hypothesis, like the second, can not be entirely excluded because wasting is practically certain to have had some effect. To stand alone, however, it requires the assumption that the area in question was completely or nearly completely leveled in Schooley time.

4. The region under discussion was near the headwaters of pre-Schooley streams and was never completely reduced, i. e., a monadnock area or a divide with considerable relief. Most of the present physiographers agree that the present main drainage systems antedate the Schooley Peneplain[11]. If this is true it is necessary that the Schooley streams have some gradient and major divides were probably somewhere near their present location. Fenneman[12] recognizes Wright's[13] delineation of the Schooley surface and apparently accepts the warping hypothesis. On page 260 of the same book, however, Fenneman states:

> "Remarkable as the Schooley peneplain was, its perfection must not be overestimated. Streams were not left without gradient nor divides without slope."

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[7]Hayes, C. W., Physiography of the Chattanooga District, U. S. Geol. Sur. Ann. Rept., pt. 2, p. 26, 1899.

[8]Fenneman, N. M., Jour. Geol., Vol. 16, pp. 746-754, 1908; Bull. Geol. Soc. Amer., Vol. 47, pp. 173-186, 1936; Physiography of Eastern United States, McGraw-Hill, pp. 199-200, 1938.

[9]Wright, F. J., The Older Appalachians of the South, Jour. Sci. Lab. Denison Univ., Vol. 26, p. 156, 1931.

[10]Ashley, G. H., Bull. Geol. Soc. Amer. Vol. 46, p. 1403, 1935.

[11]See, Ver Steeg, Karl, Wind Gaps of the Northern Appalachians, Ann. N. Y. Acad. Sci., Vol. 32, pp. 87-220, 1930; also Johnson, Douglas, Stream Sculpture on the Atlantic Slope, Columbia Univ. Press, 1931; also Meyerhoff, H. A. and Olmstead, E. W., The Origin of the Appalachian Drainage, Amer. Jour. Sci., 5th ser. Vol. 32, No. 187, pp. 21-42, July 1936; also Fenneman, op. cit., pp. 260.

[12]Op. cit. pp. 250, 289 and 298.

[13]Op. cit.

AN INTERMEDIATE SURFACE.

In central Greenbrier County there is an area of relatively low relief, developed mainly upon Greenbrier Limestones with the shales and sandstones of the Maccrady and upper Pocono also affected. This area, some six or eight miles wide, crosses the county in a northeast-southwest direction. The surface is best seen around Lewisburg and Frankford where it has an elevation of 2250 to 2350 feet and is approximately 600 feet above Greenbrier River.

In Pocahontas County, Price[14] has described an intermediate erosion surface at an elevation of about 2500 feet or roughly 400 feet above Greenbrier River. Despite the difference of elevation, it is believed that the area of low relief in central Pocahontas County and that in central Greenbrier are of the same age. In Monroe County, Reger[15] has described the same surface as occurring around Union, Pickaway, Monitor, Sinks Grove, and Johnson Crossroads, at an elevation of 2000 to 2200 feet.

In the reports cited above this erosion surface was correlated with the Harrisburg Peneplain of Dauphin County, Pennsylvania, but it now appears that it is more likely to correlate with the Allegheny Peneplain of Ashley.[16]

STREAM TERRACES.

Stream terraces are found in many localities along the major streams of Greenbrier County. Prominent local terraces were noted at Harpers, Judyton P. O. (Keister Station), Anthony, and at several other points. It is significant that most if not all of the terraces along the Greenbrier River are on the up-stream side of meanders. This fact suggests that the terraces originated in the normal migration of the meanders of the river and that they can not be correlated with cycles or partial cycles of erosion.

[14]Price, P. H., Pocahontas County Rept., W. Va. Geol. Sur., pp. 24-25, 1929.

[15]Reger, D. B., Mercer, Monroe and Summers Counties Rept., W. Va. Geol. Sur., pp. 62-63, 1926.

[16]Ashley, Geo. H., Scenery of Pennsylvania, Pa. Geol. Sur., Bull. G-6, pp. 23.ff., 1933. See also, Fridley, H. M., and Nolting, J., Peneplains of the Appalachian Plateau, Jour. Geol., Vol. 39, pp. 749-756, 1931. These authors credit the term to Ashley. See also, Fenneman, N. M., op. cit., pp. 296-300.

FLOOD-PLAINS.

Probably the most interesting physiographic feature in Greenbrier County is the existence of comparatively broad, local flood-plains along many of the streams. From west to east across the county, streams that have formed broad flood-plains are as follows:

1. Meadow River and tributaries (2425).
2. Muddy Creek (1625).
3. Sinking Creek (2190).
4. Roaring Creek and Little Roaring Creek (2275).
5. Howard Creek (1800).
6. Anthony Creek (1925-1950).

The figures in parenthesis are the approximate elevations of the major flood-plain along the stream indicated. The fact that no two flood-plains are near the same elevation indicates that each is due to local conditions.

Meadow River has developed a large flood-plain that is the result of planation of non-resistant rocks behind a barrier of rock resistant to erosion. The river and its tributaries have base-leveled 15 to 20 square miles of area, cutting across different beds of the Mauch Chunk Series. The chief barrier appears to be that of the Pottsville sandstones which dip below stream level about one and a half miles northwest of Rainelle. The Princeton Sandstone goes below drainage between Rupert and Charmco and was undoubtedly a contributing factor.

The flood-plains of Muddy Creek, Sinking Creek, and Roaring Creek have been developed at or near the contact of the Greenbrier Limestone and the overlying Mauch Chunk shales. Apparently the limestone is sufficiently resistant to surface erosion to act as a barrier, holding up the stream and thereby causing planation of the non-resistant shales. These three flood-plains suggest a method that may have operated in the past to expose a part of the vast area of Greenbrier Limestone outcropping in the county.

Howard Creek has developed a rather large flood-plain on the shales of the lower Portage, Genesee, and Marcellus. The chief barriers to the local planation along this stream are the quartzites and sandstones, of Pocono and Chemung age, that dip below drainage just east of Caldwell.

Along Anthony Creek the conditions favorable to local base-leveling are found in two localities and as a result two comparatively broad flood-plains have been developed. In each case the shales and thin sandstones upon which the flood-plains have been developed are of Portage, Genesee, and Marcellus age. The flood-plain west of Alvon narrows abruptly as the Chemung-Portage contact is crossed and disappears just west of Blue Bend Forest Park. It is apparent that the Chemung sandstones form the erosion barrier. Whether the flood-plain east of Alvon is genetically separate from the one just described is open to question. However, the presence of rapids in the gorge, just west of Alvon, and the fact that the eastern flood-plain is at a somewhat higher elevation than the one west of Alvon, indicate that the Lower Devonian and Silurian rocks in the gorge have been effective barriers to erosion. It is probable that the flood-plain east of Alvon would not have been so extensive if the Chemung sandstones had not, in effect, decreased the stream-gradient west of Alvon.

PRESENT TOPOGRAPHIC FEATURES.

All of the mountains in Greenbrier County that have an elevation of 4000 feet or over are in the northwest part of the county and in each case the mountain is capped by Pottsville sandstone. The major drainage channel in the western part of the county have elevations from 2400 to 3000 feet, making the net height of the mountains 1000 to 1500 feet. The highest point in the county is Grassy Knob with an elevation of 4372 A. T. Other points above 4300 are Cold Knob (4345) and Job Knob (4338). The lowest point in the county is where the Greenbrier River leaves the county just west of Alderson with an elevation of approximately 1520 feet.

East of the Greenbrier River the mountains rarely reach an elevation of 3500 feet and the majority have an elevation between 2750 and 3500 feet. The major streams are at elevations of 1800 to 2300 making the net height of the mountains 700 to 1500 feet. From these figures it may be seen that the topographic relief of the eastern part of the county is practically as great as that of the western part.

In the central part of the county there is a large area with a topographic relief that is generally less than 500 feet.

In the main, this relatively flat area is underlain by the Greenbrier Limestone and is characterized by the presence of hundreds of sink-holes.

DRAINAGE BASINS.

A general view of the drainage system of Greenbrier County can be seen on Figure 6, and a detailed study can be made of the streams from Maps I and II, which are found in the Atlas accompanying this report. East of the plateau region the major streams, in general, parallel the mountain ranges, while the minor streams have cut across them at right angles, a condition that prevails throughout the Allegheny Ridges region. In the Plateau region the streams have followed the lines of least resistance or down the regional dip.


FIGURE 6
MAP
OF
GREENBRIER COUNTY
SHOWING
DRAINAGE
FALLING SPRINGS
ANTHONY CREEK
FRANKFORD
LEWISBURG
WHITE SULPHUR
FORT SPRINGS
IRISH CORNER
WEBSTER CO
POCAHONTAS CO
ALLEGHENY CO
MONROE CO
Scale

TABLE OF STREAM DATA.

The following table by Professor Geo. W. Grow gives a list of all the principal streams of Greenbrier County, the length of the streams as well as the air-line distance from source to mouth, also the total fall of the streams and rate of fall per mile. In the last column is given the ratio of the meander distance or total distance (T. D.) to the air-line distance (A. L. D.):

Table of Stream Data.

STREAMS.	Total Distance Miles.	Total Fall Feet.	Rate of Fall per Mile. Feet.	Air-Line Distance. Miles.	Ratio, Total Distance to A. L. D.
Greenbrier River, source to East Fork to mouth	164.8	2500	15.17	98.64	1.67
Greenbrier River, source of West Fork to mouth	162.9	2250	13.81	97.14	1.68
Greenbrier River, Pocahontas Co. line to Summers Co. line	55.61	432	7.77	31.86	1.75
Greenbrier River, Summers-Greenbrier Co. line to mouth	26.76	130	4.86	13.21	2.03
Greenbrier River, junction of East and West Forks at Durbin to mouth	144.0	1325	9.20	83.49	1.72
Muddy Creek	19.20	750	12.96	12.15	1.58
Mill Creek	7.90	955	120.89	6.61	1.19
Kitchen Creek	8.30	900	108.43	5.75	1.44
Saw Mill Hollow	2.40	525	218.75	1.70	1.41
Lorenze Creek	4.40	700	159.09	3.73	1.18
Snake Run	5.70	1250	219.30	4.90	1.16
Alum Run	4.10	640	156.10	3.15	1.30
Second Creek	23.80	990	41.58	14.89	1.60
Howard Creek	14.30	555	38.81	10.65	1.34
Monroe Draft	4.65	935	203.23	4.04	1.15
Harts Run	6.86	550	80.17	5.51	1.25
Rocklick Run	2.15	760	353.49	1.92	1.12
Dry Creek	9.45	810	85.71	7.60	1.24
Broad Run	2.20	605	275.00	1.97	1.12
Tuckahoe Run	4.05	515	127.16	3.55	1.14
Quarry Hollow	2.05	715	348.78	1.97	1.04
Spring Run	4.80	655	136.46	4.39	1.09
Jericho Draft	4.40	480	109.09	3.99	1.10
Sulphur Lick Run	3.20	575	179.69	2.91	1.10
Pond Lick Run	2.85	655	129.82	2.47	1.15
Slash Lick Run	3.92	555	141.58	3.50	1.12

Table of Stream Data—(Continued).

STREAMS.	Total Distance Miles.	Total Fall Feet.	Rate of Fall per Mile. Feet.	Air-Line Distance. Miles.	Ratio, Total Distance to A. L. D.
Boulder Run	2.37	980	413.50	2.27	1.04
Anthony Creek	27.99	1425	50.75	22.36	1.25
Laurel Creek	2.96	1050	354.73	2.76	1.07
Big Draft	2.76	360	130.43	2.27	1.22
Rocky Run	2.86	1130	395.10	2.32	1.23
Little Creek	8.38	725	86.52	7.99	1.05
Dawson Run	1.58	705	446.20	1.53	1.03
Pantherlick Run	1.53	505	330.07	1.50	1.02
Fleming Run	4.39	435	89.09	4.00	1.10
Whitmans Draft	4.39	780	177.68	3.70	1.19
Whites Draft	4.44	765	172.30	3.95	1.24
Wades Draft	3.95	925	234.18	3.76	1.05
Turkeypen Run	1.48	610	412.16	1.31	1.13
Wiley Run	2.37	760	320.68	2.27	1.04
Humphreys Draft	2.76	660	239.13	2.38	1.16
Barnes Lick Run	2.07	715	345.41	1.91	1.08
Stony Run	2.47	605	244.94	2.27	1.09
Sims Run	2.37	475	200.40	1.97	1.20
Meadow Creek	14.06	1415	100.64	11.10	1.27
Laurel Creek	4.44	656	147.75	4.27	1.04
North Fork of Anthony Crk.	12.33	1205	97.73	11.25	1.10
Onemile Run	1.68	445	264.88	1.58	1.06
Twomile Run	1.97	655	332.49	1.68	1.17
Fourmile Run	1.59	405	254.72	1.48	1.07
Hoffman Run	1.48	355	239.86	1.28	1.16
Coles Run	2.47	675	273.28	2.07	1.19
Pondlick Run	1.18	330	279.66	1.09	1.08
Sugar Run	2.47	765	309.72	2.22	1.11
Bear Branch	1.82	585	321.43	1.78	1.02
Laurel Run	7.69	1055	137.19	5.53	1.39
Boardhouse Run	1.68	750	446.43	1.53	1.10
Spring Creek	21.31	1675	78.60	11.30	1.89
Dry Run	2.71	1110	409.59	2.47	1.10
Robbins Run	7.05	1405	199.29	4.34	1.62
Boggs Run	1.87	1030	550.80	1.68	1.11
Rockcamp Run	2.17	570	262.67	2.08	1.04
Panther Camp Creek	3.45	1055	305.80	2.77	1.52
Board Lick Run	1.23	1150	934.96	1.14	1.08
Wolfpen Run	2.07	520	251.21	1.99	1.04
Boggs Run	1.68	370	220.24	1.66	1.04
Big Run	1.97	650	329.95	1.89	1.04
Snodgrass Run	3.95	790	200.00	3.16	1.25
Slabcamp Run	5.18	800	154.44	3.46	1.50
Red Run	1.88	505	268.61	1.73	1.09
Kincaid Run	3.06	1125	367.65	2.86	1.07
Davy Run	3.21	825	257.01	2.98	1.08
Spice Run	5.43	595	109.58	4.65	1.17

Table of Stream Data—(Continued).

STREAMS.	Total Distance Miles.	Total Fall Feet.	Rate of Fall per Mile. Feet.	Air-Line Distance. Miles.	Ratio, Total Distance to A. L. D.
Milligan Creek (surface length only)	6.61	385	58.25	5.30	1.25
Culverson Creek (surface length only)	9.47	400	42.24	5.92	1.60
Burns Run	2.96	600	222.97	2.45	1.21
Spice Run	2.76	210	76.09	2.09	1.32
Indian Creek	3.45	810	234.78	3.02	1.14
Sinking Creek (surface length only)	12.53	1450	157.22	5.87	2.13
Hughart Creek	4.93	800	162.27	4.57	1.08
Flynn Creek	4.19	1835	437.95	3.28	1.28
Roaring Creek (surface length only)	5.23	1715	327.92	3.24	1.61
Little Roaring Creek	2.86	1400	489.51	2.09	1.37
Meadow River	52.58	1620	30.81	31.09	1.69
Anglins Creek	12.53	1455	116.12	9.76	1.28
Youngs Creek	5.57	860	154.40	3.77	1.48
North Prong	2.52	790	313.49	2.37	1.06
Spring Creek	1.68	580	345.24	1.63	1.03
Haynes Branch	1.59	690	433.96	1.53	1.04
Burdette Creek	3.45	970	281.16	3.41	1.01
Piney Creek	1.73	305	176.30	1.58	1.09
Toms Creek	2.86	470	164.34	2.82	1.01
Meadow Creek	8.24	340	41.26	7.11	1.16
Sewell Creek	10.16	540	53.15	8.13	1.25
Little Sewell Creek	4.73	240	50.74	4.14	1.14
Boggs Creek	5.13	285	55.56	4.74	1.08
Wolf Pen Creek	2.71	670	247.23	2.14	1.27
Little Creek	3.45	755	218.84	3.04	1.13
Laurel Creek	3.55	785	221.12	3.19	1.11
Mill Creek	5.62	1085	193.06	5.16	1.09
Big Clear Creek	14.30	1110	77.62	12.41	1.15
Brown Creek	5.23	1220	233.27	4.94	1.06
South Fork	8.88	1375	154.84	7.75	1.15
Smokehouse Branch	2.27	625	275.33	2.22	1.02
Old Field Branch	2.86	665	232.52	2.78	1.03
Job Knob Branch	3.95	965	244.30	3.28	1.20
Sam Creek	2.95	580	120.43	2.81	1.05
Elijah Branch	2.07	420	202.90	1.97	1.05
Road Branch	1.49	405	271.81	1.30	1.15
North Fork	3.06	305	99.67	2.86	1.07
Little Clear Creek	14.11	1655	117.29	10.53	1.34
Beaver Creek	4.44	845	190.32	3.43	1.29
Stony Run	2.38	1320	554.62	2.29	1.04
Rader Run	2.27	1380	607.93	2.17	1.05
Laurel Creek	3.06	585	191.18	3.02	1.01
Kuhn Branch	2.27	995	438.32	2.20	1.03

Table of Stream Data—(Concluded).

STREAMS.	Total Distance Miles.	Total Fall Feet.	Rate of Fall per Mile. Feet.	Air-Line Distance. Miles.	Ratio, Total Distance to A. L. D.
Otter Creek	6.31	355	56.26	2.38	2.65
Methodist Branch	2.56	35	13.67	2.41	1.06
Smoot Branch	1.97	35	17.77	1.85	1.06
Eagle Branch	2.22	70	31.53	1.63	1.36
Buffalo Creek	4.04	325	81.05	3.95	1.02
Morris Branch	4.78	245	51.26	3.30	1.45
Patterson Creek	2.47	140	56.68	2.20	1.12
(Gauley River)					
Hominy Creek	22.59	2220	98.27	14.91	1.52
Price Fork	2.81	445	158.36	2.56	1.10
Preaser Branch	2.56	605	236.33	2.27	1.13
(Cherry River)					
Laurel Creek	15.14	1550	102.38	12.05	1.26
McMillion Creek	4.39	1010	230.07	4.00	1.10
Mill Branch	1.97	580	294.42	1.87	1.05
Beech Run	2.66	740	278.20	2.52	1.06
Hogcamp Run	2.71	860	317.34	2.39	1.31
Manning Branch	2.71	855	315.50	2.53	1.07
Middle Branch	2.81	730	259.79	2.71	1.04
Cold Spring Branch	3.21	760	236.76	2.70	1.19
Linn Branch	1.97	770	390.86	1.62	1.22
Little Laurel Creek	6.71	950	141.58	5.30	1.27
Baber Branch	1.82	980	538.46	1.73	1.05
Improvement Branch	2.96	700	236.49	2.50	1.18
South Fork of Cherry River	16.28	1860	114.25	10.60	1.54
Shiras Run	1.63	830	509.20	1.34	1.22
Elklick Run	1.68	920	547.62	1.61	1.04
Rocky Run	5.08	1235	243.11	3.51	1.45
Little Rocky Run	1.97	1070	543.15	1.83	1.08
Becky Run	2.27	710	312.78	1.94	1.17
Cold Knob Fork	5.18	755	145.75	4.49	1.15
Blizzard Run	1.43	875	611.89	1.35	1.06
Little Blizzard Run	1.18	640	542.37	1.06	1.11
Big Run	1.68	580	345.24	1.56	1.08
North Fork of Cherry River	17.26	2045	118.48	10.62	1.63
Coats Run	2.17	985	453.92	1.85	1.17
Little Lick Run	1.43	750	524.48	1.20	1.19
Windy Run	1.48	470	317.57	1.33	1.12
Armstrong Run	1.13	490	433.63	0.986	1.15
Hamrick Run	1.48	590	398.65	1.13	1.31
Rabbit Run	0.94	305	324.47	0.70	1.34
Carpenter Run	1.18	550	368.10	1.12	1.05
Deacon Run	0.99	500	505.05	0.95	1.04
Fallen Timber Run	1.23	640	520.33	1.01	1.22
Bear Run	2.27	480	211.45	2.03	1.12
Dogway Fork (of Cranberry River)	8.09	1415	174.91	6.12	1.32

DRAINAGE AREAS OF GREENBRIER COUNTY.

The following table by Professor Geo. W. Grow gives a list of the principal streams of Greenbrier County with their drainage areas computed by planimeter from the topographic maps:

Areas of Drainage Basins.

STREAMS	Square Miles.
Greenbrier River, entire	1,634.65
Greenbrier River, in Greenbrier County	679.02
Greenbrier River, in Pocahontas County	687.06
Muddy Creek	75.91
Mill Creek	15.74
Kitchen Creek, Total area	26.50
Kitchen Creek, in Greenbrier County	25.77
Kitchen Creek, in Summers County	0.73
Saw Mill Hollow	4.25
Lorenze Creek	5.75
Snake Run	7.66
Alum Run	6.87
Second Creek, entire	116.34
Second Creek (Greenbrier County)	13.86
Howard Creek (entire)	91.01
Monroe Draft	6.67
Harts Run	11.84
Rock Lick Run	1.36
Dry Creek	22.88
Broad Run	2.50
Tuckahoe Run	9.33
Quarry Hollow	2.11
Spring Run	7.11
Jericho Draft	12.49
Sulphur Lick Run	4.95
Pond Lick Run	2.01
Slash Lick Run	3.47
Boulder Run	2.17
Anthony Creek (entire)	147.87
Laurel Creek	2.54
Big Draft	3.67
Rocky Run	1.86
Little Creek	15.05
Dawson Run	0.75
Panther Lick Run	0.87
Fleming Run	9.14
Whitmans Draft	2.90
Whites Draft	7.12
Wades Draft	3.79
Turkeypen Run	0.79
Wiley Run	3.48
Humphreys Draft	2.31
Barnes Lick Run	0.82
Stony Run	1.11
Sims Run	2.50

Areas of Drainage Basins (Continued).

STREAMS	Square Miles.
Meadow Creek	23.21
Laurel Run	4.96
North Fork of Anthony Creek (entire)	22.89
North Fork of Anthony Creek (above Pocahontas line)	7.20
Onemile Run	1.62
Twomile Run	2.30
Fourmile Run	1.56
Hoffman Run	1.04
Coles Run	1.99
Pondlick Run	0.67
Sugar Run	1.92
Bear Run	1.08
Laurel Run	12.31
Boardhouse Run	1.52
Spring Creek	76.31
Dry Run	5.23
Robbins Run	11.41
Boggs Run	2.24
Rockcamp Run	2.75
Panther Camp Creek	4.88
Board Lick Run	1.40
Wolfpen Run	1.98
Boggs Run	2.36
Big Run	1.49
Snodgrass Run	3.49
Slabcamp Run	5.81
Red Run	0.91
Kincaid Run	2.29
Davy Run	2.90
Spice Run	8.38
Milligan Creek (surface area only)	25.87
Culverson Creek (surface area only)	35.13
Spice Run	2.41
Burns Run	2.78
Indian Creek	2.59
Sinking Creek (surface area only)	41.39
Hughart Creek	7.55
Flynn Creek	2.59
Roaring Creek (surface area only)	7.94
Little Roaring Creek	2.83
Meadow River (entire)	360.77
Meadow River (above Nicholas County line)	282.16
Anglins Creek (entire)	32.98
Anglins Creek (in Greenbrier County)	4.21
Youngs Creek	10.96
North Prong	1.78
Spring Creek	1.01
Haynes Branch	0.67
Burdette Creek	5.46
Piney Creek	1.58
Toms Creek	3.20
Meadow Creek	10.40

Areas of Drainage Basins (Continued).

STREAMS	Square Miles.
Sewell Creek (entire)	40.55
Sewell Creek (in Greenbrier County)	22.45
Little Sewell Creek	16.82
Boggs Creek	10.16
Wolf Pen Creek	2.93
Little Creek	3.54
Laurel Creek	5.91
Mill Creek	6.94
Big Clear Creek	51.89
Brown Creek	6.90
South Fork	18.90
Smokehouse Branch	3.18
Old Field Branch	4.27
Old Knob Branch	4.38
Sam Creek	2.74
Elijah Branch	1.72
Road Branch	1.18
North Fork	5.31
Little Clear Creek	33.40
Beaver Creek	7.20
Stony Run	1.34
Rader Run	2.10
Laurel Creek	4.46
Kuhn Branch	2.59
Otter Creek	15.69
Methodist Branch	2.27
Smoot Branch	1.76
Eagle Branch	2.98
Buffalo Creek	5.78
Morris Branch	3.69
Patterson Creek	3.18
(Gauley River)	
Hominy Creek (entire)	104.81
Hominy Creek (in Greenbrier County)	10.98
Price Fork	2.93
Peaser Branch	2.30
Cherry River (entire)	171.90
Cherry River (in Greenbrier County)	122.64
Laurel Creek (entire)	42.02
Laurel Creek (in Greenbrier County)	32.77
McMillion Creek	3.56
Mill Branch	1.44
Beech Run	3.18
Hogcamp Run	2.58
Manning Branch	1.91
Middle Branch	2.37
Cold Spring Branch	2.95
Linn Branch	2.12
Little Laurel Creek (entire)	18.40
Little Laurel Creek (in Greenbrier County)	14.26
Baber Branch	1.08
Improvement Branch	3.31
South Fork of Cherry River (entire)	57.56

Areas of Drainage Basins (Concluded).

STREAMS	Square Miles.
South Fork of Cherry River (in Greenbrier County)	55.18
Shiras Run	1.65
Elklick Run	1.18
Rocky Run	8.46
Little Rocky Run	1.81
Becky Run	3.46
Cold Knob Fork	8.77
Blizzard Run	1.23
Little Blizzard Run	0.65
Big Run	1.05
North Fork of Cherry River (entire)	36.98
North Fork of Cherry River (in Greenbrier County)	20.43
Coats Run	1.84
Little Lick Run	1.21
Windy Run	0.74
Armstrong Run	0.64
Hamrick Run	0.78
Rabbit Run	0.69
Carpenter Run	0.93
Deacon Run	0.61
Fallen Timber Run	0.78
Bear Run	3.66
Dogway Fork (of Cranberry River)	9.78
Dogway Fork (in Greenbrier County)	0.45

DESCRIPTION OF DRAINAGE BASINS.

Greenbrier River.—Greenbrier River, the stream that carries the greater part of Greenbrier County's rainfall, has its source in two forks heading in the extreme northern end of Pocahontas County. West Fork heads east of Shavers Mountain about two miles northeast of Wildell with an elevation of 3,625 feet. East Fork heads at Blister Swamp on the west slope of Allegheny Mountain with an elevation of 3,875 feet and flows in a southwest direction to join the West Fork at Durbin where it makes the Greenbrier River proper. The Greenbrier flows in a comparatively straight line in a southwest direction across Pocahontas and Greenbrier Counties to a point south of Lewisburg where it turns westward to form part of the Greenbrier-Monroe County line. Here it enters Summers County and after much meandering joins New River at Bellepoint, 1½ miles south of Hinton, with an elevation of 1,375 feet.

From the Table of Stream Data on page 39, it can be seen that from its mouth to its East Fork source it has a meandering length of 164.8 miles with an air-line distance of 98.64 miles, or a ratio of 1.67. It has a total fall of 2,500 feet or at a rate of 15.2 feet per mile. From its mouth to its West Fork source it has a meandering length of 162.9 miles with an air-line distance of 97.14 miles or a ratio of 1.67 also. The fall is much more rapid near its source than at the mouth as the following gradient table shows:

Gradient of Greenbrier River.

	Miles.	Elevation.	Fall. Feet.	Rate per mile. Feet.
Source of East Fork		3875		
Distance	18.8		1175	62.5
Durbin (River forks)		2700		
Source of West Fork		3625		
Distance	16.9		925	54.7
Durbin (River forks)		2700		
Distance	14.9		275	18.4
Cass		2425		
Distance	9.0		155	17.2
Clover Lick		2270		
Distance	16.8		155	9.2
Marlinton		2115		
Distance	21.5		162	7.53
Pocahontas-Greenbrier line		1953		
Distance	22.7		173	7.62
Anthony		1780		
Distance	17.6		135	7.67
Ronceverte		1645		
Distance	15.1		120	7.94
Alderson		1525		
Distance	28.4		150	5.28
Mouth (Bellepoint) (empties into New River 1½ miles south of Hinton)		1375		

According to Reger[17] Greenbrier River has a total drainage area of 1629.43 square miles. In Greenbrier County it has a drainage area of 679.02 square miles. The principal tributaries in Greenbrier are Muddy Creek, Second Creek, Howard Creek, Anthony Creek, and Spring Creek.

[17]David B. Reger, Mercer-Monroe-Summers Report, W. Va. Geol. Sur., p. 96; 1926.

A gaging station was established on the Greenbrier River at Alderson August 1, 1895, by C. C. Babb and D. C. Humphreys, of the United States Geological Survey, and since that date until the present time, with few interruptions the gage has been read daily by local observers. Mr. W. J. Hancock and Mr. W. C. England are accredited with most of this detail. Prior to October 15, 1929, the gage was located at the highway bridge at Alderson, half a mile above the mouth of Muddy Creek and thereafter 400 feet above the bridge. The non-recording gage was read to half tenths once daily prior to April 1, 1910; to half tenths twice daily, April 1, 1910 to December 31, 1911; to hundredths twice daily January 1, 1911 to October 14, 1929; recording gage thereafter. Zero of gages is 1,528.97 feet above mean sea-level. Channel described as practically permanent at the bridge and as "shifts occasionally" at the recording gage. Affected during 1914-15 by construction of new highway bridge. Sometimes affected by ice. Rating well defined to about 25,000 second-feet. Discharge measurements have been made from time to time by government officials, the work having been done partly in cooperation with the West Virginia Geological Survey.

The records for the years 1895 to 1935 are taken directly from the United States Water-Supply Papers, as follows:

1895-1920, from No. 536, pages 177-196.
1920-1922, from No. 543, pages 68-71.
1922-1923, from No. 563, pages 57-59.
1923-1924, from No. 583, pages 94-95.
1924-1025, from No. 603, pages 109-110.
1925-1926, from No. 623, page 95.
1926-1927, from No. 643, page 58.
1927-1928, from No. 663, page 62.
1928-1929, fıom No. 683, page 71.
1929-1930, from No. 698, page 75.
1930-1931, from No. 713, page 77.
1931-1932, from No. 728, page 113.
1932-1933, from No. 743, page 111.
1933-1934, from No. 758, page 119.
1934-1935, from No. 783, page 116.

Discharge measurements of Greenbrier River at Alderson, W. Va., during the years 1895-1926.

Date	Made by—	Gage height.	Discharge.
1895.		Feet.	Sec.-ft.
July 30	C. C. Babb	1.89	457
Sept. 4	D. C. Humphreys	1.36	106
1896.			
June 10	do	2.30	714
July 22	do	2.07	665
Aug. 13	do	1.95	529
Dec. 18	do	2.80	1,480
1897.			
Mar. 30	do	2.75	1,640
May 3	F. H. Anschutz	4.88	6,180
4	do	4.38	5,450
4	do	4.29	4,960
6	do	3.56	3,160
13	do	12.30	32,600
14	do	12.32	33,000
14	do	9.52	20,700
31	do	2.26	681
Oct. 12	do	1.42	71
1898.			
June 25	D. C. Humphreys	2.02	403
Aug. 3	do	2.20	665
Aug. 6	do	4.43	5,120
Dec. 22	do	3.45	2,820
1899.			
June 22	do	1.94	456
Aug. 12	do	1.36	104
1900.			
Mar. 31	do	4.07	5,130
June 29	do	1.99	564
July 24	do	1.97	493
Aug. 20	do	1.38	148
Dec. 21	do	2.24	834
1901.			
Mar. 27	do	3.45	3,140
July 30	do	1.73	276
1902.			
July 17	do	1.63	211
Aug. 12	do	1.46	156
12	do	1.46	154
1903.			
Sept. 21	Paul and Sawyer	2.03	373
Nov. 16	W. C. Sawyer	1.73	130
1904.			
June 15	F. H. Brundage	2.20	490
Aug. 9	N. C. Grover	1.72	146
Sept. 20	R. H. Bolster	1.63	114
Oct. 1	do	1.44	51
20	do	1.51	76
1905.			
Mar. 22	A. H. Horton	7.90	16,500
22	do	7.17	13,700
23	do	5.24	7,240
23	do	5.69	8,840
Sept. 15	R. H. Bolster	2.01	350
1906.			
June 13	Robert Follansbee	2.30	602
1907.			
May 10	R. J. Taylor	4.74	6,440
June 25	R. G. Knight	3.46	2,760
July 17	do	2.65	1,260
1908.		Feet.	Sec.-ft.
Apr. 21	Follansbee and Barrows	3.94	3,880
Aug. 4	W. G. Hoyt	2.15	425
Aug. 8	do	2.20	456
10	do	2.88	1,460
Sept. 18	W. M. O'Neill	1.70	175
1909.			
Nov. 19	A. H. Horton	2.12	413
Dec. 1	G. L. Parker	2.00	334
1910.			
Aug. 23	J. C. Dort	1.78	163
Oct. 11	C. T. Bailey	2.20	572
1911.			
Nov. 4	Bailey and Perwien	2.22	513
1912.			
Mar. 24	C. T. Bailey	5.88	9,200
1913.			
June 20	H. J. Jackson	2.17	459
1914.			
Dec. 1	J. G. Mathers	1.84	152
1915.			
Feb. 6	W. Kessler	4.76	6,040
1916.			
Mar. 23	A. H. Horton	4.40	4,700
Mar. 24	do	4.65	5,660
Aug. 15	B. E. Jones	2.65	1,000
1917.			
May 29	do	5.55	8,060
30	do	4.66	5,470
31	do	3.94	3,560
1918.			
Feb. 15	B. L. Hopkins	6.95	11,800
15	do	7.15	12,400
16	do	8.49	16,400
18	do	4.64	5,330
Apr. 15	do	6.16	8,840
May 15	do	3.97	2,750
June 23	do	3.64	2,060
1920.			
May 21	Peterson and Bigwood	3.36	1,660
June 23	B. L. Bigwood	3.77	2,400
Nov. 21	Bigwood and Lamoureux	2.89	931
1922.			
Feb. 24	Dirzulaitis and Bigwood	5.20	6,740
1923.			
Apr. 4	J. J. Dirzulaitis	2.98	1,190
1924.			
Oct. 18		2.42	330
Oct. 18		2.43	338
1925.			
June 30		2.64	662
Oct. 2		1.99	101
Oct. 8		2.07	133
1926.			
Jan. 22		8.98	18,600
Sept. 25		2.12	162

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1895.											
1	....	390	220	11	....	238	755	21	....	280	125
2	....	301	165	12	....	280	301	22	....	250	116
3	....	250	145	13	....	280	250	23	....	250	110
4	....	220	125	14	....	262	220	24	....	280	110
5	....	192	125	15	....	350	182	25	....	220	95
								26	....	165	95
6	....	165	165	16	....	280	125	27	....	250	90
7	....	125	157	17	....	280	145	28	....	315	82
8	....	182	157	18	....	280	137	29	....	280	82
9	....	238	145	19	....	250	125	30	430	250	82
10	....	220	165	20	....	250	125	31	350	250	....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1895-96.												
1	82	101	280	1,000	755	1,070	12,900	2,000	573	1,000	5,420	238
2	70	107	262	2,090	755	1,550	11,600	2,610	486	755	3,610	220
3	70	110	220	1,300	6,800	1,380	8,230	2,000	430	700	5,150	192
4	70	125	204	755	10,600	1,070	5,150	4,620	414	600	3,150	220
5	70	125	204	1,000	5,690	870	3,610	5,690	390	870	2,000	192
6	82	137	165	930	3,150	870	2,290	3,380	510	810	1,380	220
7	75	145	137	430	6,240	810	2,090	2,390	555	1,140	1,070	220
8	88	157	157	454	4,620	930	1,810	1,810	700	2,090	870	220
9	88	145	182	470	3,150	1,220	1,900	1,640	700	12,900	755	238
10	70	153	182	600	2,710	1,380	2,000	1,300	700	10,900	600	244
11	70	153	209	555	2,190	1,220	2,090	1,000	1,380	4,880	600	220
12	82	153	209	555	1,640	1,720	2,190	870	1,070	2,820	600	204
13	82	145	192	555	700	1,900	2,000	755	700	2,000	510	192
14	78	137	165	810	9,100	1,460	1,900	755	600	1,640	430	182
15	78	145	137	700	8,230	1,640	1,900	1,300	510	1,220	470	192
16	78	133	137	280	1,620	1,810	1,810	1,140	555	1,070	600	470
17	82	137	165	280	3,150	12,300	1,460	810	582	930	510	315
18	82	137	157	294	2,000	8,520	1,220	600	600	930	390	238
19	82	137	165	301	1,640	5,420	1,140	555	555	870	390	204
20	82	137	165	301	1,220	10,900	1,070	555	582	810	350	315
21	82	145	192	366	930	7,360	930	810	555	650	315	280
22	82	161	238	390	930	5,420	870	930	486	600	250	280
23	82	176	3,150	430	930	5,150	870	1,070	470	573	301	244
24	90	182	1,300	1,300	755	4,620	930	1,070	430	1,220	454	274
25	101	182	930	4,620	1,000	4,620	2,090	1,220	470	1,300	470	220
26	95	182	700	3,850	870	3,610	2,000	1,300	2,290	7,940	478	182
27	95	165	600	2,390	810	3,610	1,900	1,140	3,610	3,610	454	182
28	95	182	755	1,640	700	3,380	1,550	1,000	2,290	2,090	406	192
29	95	209	1,380	1,220	810	2,190	1,380	930	2,090	1,550	280	232
30	95	238	930	930	....	25,600	1,300	810	1,550	1,140	280	6,520
31	95	....	810	810	....	19,600	....	670	....	3,610	262	....
1896-97.												
1	11,600	262	6,240	510	700	2,000	1,460	680	1,140	537	870	232
2	1,100	301	3,610	470	700	1,720	1,460	2,820	1,300	2,710	755	209
3	2,290	280	2,710	494	700	1,550	1,300	6,240	1,000	4,880	1,000	209
4	1,550	350	2,000	510	555	1,460	1,300	5,150	870	2,710	1,000	192
5	1,140	15,400	1,550	600	528	2,190	1,550	3,850	1,070	1,640	870	165
6	930	21,800	1,300	1,640	4,100	2,190	6,240	3,150	1,000	2,710	810	165
7	700	16,200	1,220	1,550	11,600	2,710	4,620	2,930	930	2,610	680	182
8	600	3,150	1,070	1,000	7,360	3,610	3,150	2,390	810	2,390	650	165
9	510	2,190	1,000	870	4,620	2,930	2,930	2,000	755	1,810	555	157
10	470	1,640	1,300	870	3,150	3,150	6,240	1,720	810	1,460	510	165
11	430	1,220	2,090	870	2,820	6,240	5,420	1,640	755	1,000	510	161
12	390	1,070	1,810	700	4,360	5,420	4,100	2,190	670	1,380	486	157
13	700	930	1,550	555	7,940	5,690	2,930	17,500	700	1,220	438	141
14	650	810	1,220	510	7,080	5,150	2,290	32,300	755	930	390	141
15	630	755	1,220	470	6,800	10,000	2,000	9,700	700	810	374	137
16	600	650	1,900	700	7,080	7,080	1,900	6,240	1,900	670	374	133
17	510	600	1,900	700	7,080	4,360	1,810	4,100	1,300	582	350	125
18	470	555	1,640	700	5,150	3,610	1,810	3,150	1,140	510	336	125
19	430	537	1,300	1,220	5,420	9,700	1,550	2,390	1,000	600	315	119
20	390	510	1,140	1,300	5,150	12,300	1,460	2,000	1,720	650	294	119
21	336	510	1,000	1,140	5,150	10,300	1,380	1,720	1,810	870	280	125
22	315	591	870	1,140	24,100	4,620	1,220	1,550	1,550	6,240	262	125
23	301	700	755	1,220	51,500	4,100	1,070	1,380	1,300	5,690	262	116
24	280	700	700	1,220	20,700	3,150	1,000	1,220	1,070	4,100	350	116
25	280	700	430	1,000	9,160	2,890	870	1,070	1,000	4,100	301	119
26	301	680	280	1,070	5,690	2,390	870	1,070	1,070	2,500	329	125
27	280	650	165	930	3,610	2,000	870	930	700	2,820	268	110
28	350	650	125	870	2,610	1,810	810	870	630	2,710	268	125
29	301	1,000	350	755	....	1,720	755	810	555	1,300	280	125
30	280	8,520	470	700	....	1,550	700	755	510	1,140	256	125
31	280	....	555	700	....	1,550	....	755	....	1,070	244	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1897-98.												
1..........	137	125	510	810	1,550	1,220	7,940	1,640	1,300	470	700	390
2..........	119	176	430	870	930	1,220	5,420	1,380	1,070	406	1,300	390
3..........	125	157	390	1,460	755	1,140	4,360	1,220	930	358	755	238
4..........	125	209	390	700	930	1,070	3,380	1,140	810	336	700	315
5..........	145	192	810	620	1,550	1,070	2,930	1,070	700	510	10,300	268
6..........	141	220	2,390	650	930	1,140	2,930	2,000	650	870	7,940	315
7..........	129	220	2,190	680	930	1,140	2,710	16,400	573	600	7,940	350
8..........	125	256	1,380	670	1,070	1,140	2,500	14,000	528	564	3,380	510
9..........	125	232	1,000	690	930	1,220	2,500	7,360	494	470	2,090	430
10..........	119	220	755	3,150	1,070	1,300	2,390	4,620	470	406	14,600	390
11..........	113	220	555	12,900	1,640	1,220	4,100	2,290	430	366	42,900	350
12..........	125	220	555	6,520	2,190	1,300	13,300	2,820	870	280	12,900	315
13..........	129	430	494	4,620	3,150	1,380	7,650	2,190	630	238	7,360	280
14..........	133	238	470	4,100	2,820	1,460	5,690	1,900	528	301	4,880	250
15..........	137	315	486	3,150	2,290	1,460	5,690	1,640	1,140	280	3,150	250
16..........	137	294	870	15,700	2,000	1,380	5,420	1,720	1,000	343	2,190	238
17..........	137	308	2,000	7,940	1,640	1,300	6,800	1,810	930	414	1,640	238
18..........	116	268	1,460	4,620	1,380	7,360	4,880	2,610	930	430	1,300	209
19..........	176	250	1,220	3,150	1,550	9,400	3,610	2,290	870	1,000	1,070	209
20..........	165	262	1,140	2,390	3,150	7,360	2,710	2,090	1,140	870	1,140	209
21..........	176	250	1,380	2,390	4,100	4,620	2,290	1,810	1,220	700	1,300	209
22..........	182	262	4,880	2,610	5,690	3,380	1,900	1,550	1,000	537	1,070	220
23..........	165	262	3,610	3,380	3,850	2,710	1,720	6,800	930	462	870	250
24..........	165	220	2,290	5,690	2,820	2,390	1,550	8,230	650	555	700	280
25..........	165	220	1,640	4,100	2,290	7,650	2,610	5,690	537	755	755	350
26..........	187	204	1,070	4,100	1,900	7,650	2,710	3,610	478	555	650	366
27..........	176	192	870	4,100	1,640	5,150	2,820	2,710	446	582	555	322
28..........	176	192	1,000	3,150	1,380	3,610	2,500	2,000	454	2,930	555	301
29..........	176	336	755	2,500	....	4,620	2,190	1,720	600	2,710	510	280
30..........	157	573	650	2,190	....	16,400	1,900	1,460	528	1,550	470	268
31..........	145	....	650	1,720	....	10,900	....	1,460	....	1,000	430	....
1898-99.												
1..........	232	1,220	1,300	1,550	1,300	9,100	4,360	930	1,460	336	157	95
2..........	232	1,220	1,300	1,460	1,720	6,800	3,380	930	2,190	315	137	125
3..........	204	1,140	1,000	1,460	930	10,000	2,610	1,460	2,290	301	137	119
4..........	204	930	870	1,460	755	35,500	2,190	1,220	1,720	294	104	110
5..........	209	930	2,390	2,930	5,690	45,300	1,720	1,140	1,300	262	157	145
6..........	220	870	4,100	7,940	10,300	27,600	1,640	1,070	1,000	226	110	133
7..........	398	870	2,610	18,600	9,100	10,900	1,460	1,300	870	209	75	116
8..........	336	930	2,000	9,700	5,420	6,520	1,900	7,940	755	226	110	153
9..........	280	870	1,550	5,690	3,380	4,620	6,240	14,000	1,000	238	110	192
10..........	280	810	1,380	3,850	2,090	3,850	4,360	10,600	755	232	107	153
11..........	280	930	1,900	2,930	1,380	3,610	3,150	5,690	755	244	107	165
12..........	294	3,850	870	2,290	1,300	3,610	2,710	4,880	1,380	220	113	165
13..........	280	2,710	1,070	2,000		3,150	2,390	5,690	2,500	209	119	153
14..........	280	2,000	1,140	1,900		2,820	2,190	6,240	1,720	220	101	133
15..........	280	1,720	1,300	3,850	1,250	3,150	2,000	5,150	1,640	209	810	119
16..........	250	1,380	1,070	2,500		4,100	1,810	3,610	1,460	198	510	125
17..........	250	1,220	630	4,100	1,220	4,360	1,640	2,820	1,070	176	294	119
18..........	250	1,380	755	3,380	1,380	3,610	1,550	2,190	870	176	220	101
19..........	755	5,690	755	2,930	1,550	6,800	1,460	2,000	755	192	119	125
20..........	1,220	10,300	930	2,390	2,090	10,900	1,380	1,720	700	209	125	153
21..........	1,810	7,360	1,460	1,900	5,150	6,800	1,220	1,720	650	192	110	157
22..........	23,000	4,620	2,820	1,720	12,300	4,620	1,070	1,380	537	238	133	133
23..........	11,600	3,610	8,810	1,720	11,600	3,610	1,000	1,220	422	220	113	250
24..........	4,880	3,850	8,810	1,550	7,360	3,380	930	1,070	600	187	116	280
25..........	2,820	3,150	5,150	1,640	4,880	2,930	870	930	470	192	95	220
26..........	2,000	2,390	3,380	2,500	3,610	2,610	1,220	870	446	165	95	209
27..........	1,900	2,090	2,500	2,190	18,600	2,290	1,720	755	406	187	90	192
28..........	1,220	1,720	2,000	2,000	15,000	2,190	1,380	700	430	165	82	182
29..........	1,220	1,380	1,720	1,810	....	10,900	1,140	670	446	209	116	165
30..........	1,070	1,380	1,460	1,380	....	9,700	1,070	650	390	176	101	165
31..........	1,220	....	1,380	1,460	....	5,690	....	810	....	165	101	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1899-1900												
1	157	116	176		650	4,100	3,850	810	755	1,460	1,000	192
2	133	157	165		390	12,300	2,930	755	650	1,900	650	182
3	133	209	145		470	7,080	2,500	680	600	1,000	510	157
4	133	209	145	390	470	4,100	2,290	650	700	930	430	145
5	125	220	145		470	3,150	2,090	600	630	582	350	125
6	125	268	145		600	3,150	1,900	555	555	510	280	119
7	125	232	145	390	930	5,420	1,720	528	494	430	133	110
8	125	209	133	390	1,220	6,520	1,550	510	430	494	220	95
9	104	182	125	390	3,610	4,620	1,900	470	430	454	204	90
10	119	157	125	555	4,620	3,380	1,900	600	414	336	192	88
11	110	157	125	555	2,820	2,820	1,640	510	366	301	176	82
12	107	157	157	670	2,090	2,190	1,300	470	315	250	157	78
13	107	145	700	4,620	13,600	1,900	1,140	486	268	238	145	70
14	116	137	930	2,190	16,000	1,720	1,070	446	280	220	125	70
15	113	137	1,000	1,550	6,800	1,810	870	390	555	192	125	98
16	110	137	700	1,140	4,100	1,640	810	374	810	176	125	414
17	110	125	510	930	2,930	1,640	700	350	2,290	145	110	250
18	85	125	315	930	2,090	1,220	930	329	7,360	145	116	165
19	85	119	301	1,300	1,300	1,720	1,070	301	5,150	145	125	145
20	95	119	322	9,700	1,070	16,800	2,710	350	2,930	133	116	125
21	95	133	390	8,520	1,140	17,100	3,150	1,720	1,900	133	125	119
22	88	119	315	4,880	4,100	8,230	3,150	1,070	1,300	157	125	137
23	75	119	301	2,820	7,940	5,420	3,380	810	1,000	600	165	165
24	101	119	336	2,000	5,150	2,710	2,820	700	755	700	125	238
25	90	125	301	1,460	3,610	6,240	2,190	700	650	755	145	165
26	82	125	630	1,140	2,930	5,690	1,720	1,070	573	1,000	125	182
27	82	113	528	1,000	2,290	6,240	1,460	1,000	555	4,100	165	145
28	82	125	350	755	1,640	4,360	700	700	470	3,850	165	125
29	82	182	350	582	....	4,100	1,000	700	470	1,720	192	145
30	75	198	350	1,000	....	3,610	930	930	510	1,070	220	125
31	101	....	350	555	....	4,360	....	930	....	1,070	165	....
1900-1.												
1	125	145	1,900	870	810	600	1,550	1,810	3,610	2,930	329	1,300
2	165	209	1,460	1,140	700	600	1,640	1,640	2,820	2,390	294	1,810
3	145	220	1,220	1,140	755	600	6,240	1,550	2,190	1,900	268	1,140
4	137	2,290	2,930	870	1,220	600	12,900	1,300	1,810	2,610	238	870
5	125	1,460	12,900	755	1,300	1,640	7,650	1,070	1,550	3,150	244	680
6	119	755	7,360	680	1,000	5,150	7,360	1,000	1,300	2,610	280	537
7	116	555	4,100	755	755	2,710	11,600	870	1,720	4,100	930	494
8	110	454	3,150	755	930	2,000	7,940	870	1,900	2,820	1,070	446
9	119	430	2,710	680	1,070	1,900	5,420	870	2,610	1,810	755	430
10	116	350	2,710	620	2,000	1,900	4,100	1,070	1,900	1,300	546	390
11	110	294	2,190	755	2,390	9,100	2,710	2,820	1,460	1,000	430	390
12	110	315	1,720	21,100	2,000	12,300	2,610	2,190	1,070	810	470	374
13	104	315	1,460	11,600	1,640	5,690	2,500	1,900	930	700	870	1,220
14	145	390	1,300	5,690	1,220	3,850	2,820	1,720	1,000	630	555	810
15	280	350	1,140	3,610	1,000	3,150	11,600	1,460	1,220	670	2,000	600
16	280	336	1,000	2,710	1,000	2,610	7,940	1,300	6,240	930	1,380	494
17	220	315	810	2,000	1,070	2,000	5,690	1,070	10,000	1,000	930	430
18	192	268	755	1,720	1,070	1,640	5,150	1,000	9,700	930	810	600
19	165	250	755	1,140	1,140	1,380	4,360	1,070	6,800	1,000	700	2,090
20	145	232	700	1,070	755	1,300	13,300	1,070	4,360	870	582	1,220
21	145	220	755	755	1,300	1,300	20,400	1,070	3,150	810	1,140	810
22	137	294	700	870	810	2,190	11,300	17,800	2,390	700	1,140	650
23	1,000	1,000	582	1,140	930	2,500	7,650	17,800	2,710	582	930	546
24	3,380	2,710	555	1,140	1,000	2,000	6,520	8,810	12,300	494	755	446
25	1,220	3,380	680	1,380	1,070	1,720	5,150	4,620	6,240	430	755	414
26	1,000	16,800	755	1,720	870	1,640	4,620	3,150	3,610	454	700	390
27	755	21,100	680	1,640	755	2,710	3,850	14,300	3,150	430	2,500	329
28	510	6,800	630	1,640	600	2,500	3,150	19,300	3,850	315	2,000	315
29	315	4,100	620	1,640	....	2,500	2,610	10,900	2,930	322	1,140	280
30	280	2,610	930	1,140	....	1,900	2,090	7,940	4,620	301	810	280
31	238	....	870	1,070	....	1,640	....	4,150	....	280	755	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1901-2.												
1	315	145	238	6,240	7,360	30,700	5,150	700	810	870	165	113
2	301	119	238	4,100	6,240	12,900	3,610	700	680	810	165	104
3	244	145	256	3,150	6,800	8,520	2,930	755	600	870	280	101
4	238	145	650	2,500	4,100	5,420	2,500	755	555	930	220	110
5	232	165	2,610	1,900	3,850	3.850	4,100	755	510	810	192	104
6	220	165	1,640	1,220	1,900	2,820	3,850	755	446	510	182	101
7	220	149	1,070	1,070	1,900	2,820	5,150	755	430	510	165	110
8	220	145	810	1,140	1,720	2,820	7,940	755	390	555	165	101
9	220	153	700	1,300	1,720	4,360	7,940	700	350	600	165	90
10	209	149	700	1,140	2,190	9,100	6,240	650	336	650	165	82
11	192	145	1,220	1,070	810	7,940	6,800	600	315	510	165	75
12	182	145	2,290	870	870	9,700	5,960	555	301	454	165	75
13	192	220	1,550	755	810	15,000	5,420	510	315	366	149	75
14	209	176	1,220	650	870	15,700	2,190	494	336	350	133	82
15	220	165	36,700	510	810	7,360	3,150	494	350	350	125	82
16	226	165	14,300	650	650	7,940	2,710	430	374	329	125	90
17	232	165	6,240	620	700	15,000	2,500	430	382	315	125	82
18	232	165	3,380	600	650	9,700	2,000	446	390	315	125	82
19	238	165	2,390	510	650	5,690	1,810	390	398	308	122	82
20	244	165	1,810	470	600	3,850	1,720	390	486	308	119	70
21	250	157	1,380	582	650	2,930	1,640	573	470	280	119	70
22	250	153	810	510	650	2,390	1,460	555	510	268	113	70
23	256	145	810	670	1,000	1,900	1,380	810	600	220	110	70
24	256	165	810	555	2,090	1,810	1,300	650	660	192	110	70
25	256	220	870	470	15,700	1,810	1,220	630	650	165	95	75
26	262	350	1,000	600	17,800	2,000	1,070	1,640	582	165	95	70
27	238	422	1,000	10,300	10,900	1,810	1,000	2,930	4,100	165	88	82
28	209	350	1,000	12,900	29,600	1,640	810	2,090	1,640	165	82	164
29	182	250	23,000	6,240	....	10,600	810	1,550	1,550	165	66	120
30	153	262	28,000	6,520	....	15,700	755	1,220	930	165	82	140
31	165	....	11,600	11,600	....	9,400	....	1,000	....	165	104	....
1902-3.												
1	140	86	1,160	576	6,520	23,800	2,980	2,620	855	2,500	280	267
2	101	86	4,100	708	4,360	9,400	2,380	2,040	1,920	1,520	544	164
3	246	86	3,220	23,100	5,420	5,420	2,040	1,620	1,160	1,080	788	154
4	315	101	4,620	13,600	14,300	3,850	2,040	1,330	855	814	635	154
5	246	86	2,860	8,520	19,600	2,860	2,500	1,240	696	598	356	154
6	140	79	2,500	5,150	7,650	2,260	2,500	1,080	598	855	301	132
7	120	63	2,040	3,600	5,150	1,920	2,140	928	2,380	1,080	260	113
8	86	63	1,820	2,860	3,220	2,620	3,600	928	8,810	1,330	229	95
9	76	51	1,420	2,040	2,860	7,080	8,520	855	4,620	928	200	205
10	76	53	1,330	1,720	2,260	7,940	6,800	788	2,860	696	188	132
11	76	58	1,240	928	1,720	5,420	4,620	720	2,740	490	154	113
12	86	58	788	1,420	4,360	6,240	3,100	659	4,100	443	58	113
13	164	58	1,920	1,620	6,240	5,690	2,620	598	2,860	1,240	576	95
14	415	58	7,360	1,720	4,360	4,620	2,500	544	1,920	2,260	424	95
15	396	53	5,690	928	3,600	3,600	2,860	544	1,520	1,920	267	79
16	280	53	5,420	788	20,700	2,740	2.980	490	1,240	1,160	154	95
17	205	53	6,800	1,080	24,900	2,140	2,860	462	1,160	788	154	145
18	188	56	7,080	1,080	9,400	1,720	2,380	443	855	598	120	267
19	188	56	4,880	1.160	5,690	1,520	2,380	372	720	490	113	301
20	164	58	2,860	884	3,850	1,240	2,040	396	598	396	154	287
21	120	58	2,380	855	2,860	1,160	2,040	356	512	356	132	267
22	86	58	1,720	1,160	2,620	2,620	2,380	356	415	188	120	246
23	86	86	2,500	1,330	2,140	28,000	2,260	331	396	280	132	217
24	86	101	2,140	1,240	2,140	31,100	2,040	315	396	246	132	188
25	86	117	1,720	1,080	2,140	10,600	1,920	331	396	217	120	140
26	86	2,260	1,330	1,000	2,040	5,690	3,850	396	544	188	120	132
27	86	3,100	971	971	1,920	4,100	10,000	396	471	169	65	120
28	86	2,740	598	2,620	20,700	2,980	6,520	2,380	659	164	58	120
29	86	2,620	598	11,300	....	2,380	4,360	1,520	2,260	128	58	120
30	86	1,240	788	12,600	....	1,820	3,220	1,080	4,100	164	234	120
31	86	....	659	11,300	....	2,740	....	855	....	280	267	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903-4.												
1	120	140	101	234	659	5,690	2,380	3,850	1,720	1,160	164	86
2	140	120	120	246	747	8,520	4,620	3,100	3,100	855	140	101
3	120	120	140	566	490	5,960	4,360	2,620	5,150	659	101	86
4	120	120	132	1,080	301	5,150	3,350	3,100	7,360	544	101	86
5	101	120	120	1,620	396	2,740	2,500	3,600	3,600	544	140	86
6	101	140	132	1,000	246	3,220	1,920	1,920	2,040	544	164	86
7	120	140	120	622	490	2,620	1,720	1,720	1,720	490	188	86
8	120	140	101	490	7,360	10,000	1,620	1,520	1,420	490	188	86
9	120	140	120	512	5,420	7,650	1,620	1,330	1,240	490	140	86
10	120	120	120	490	3,100	5,150	1,720	1,240	1,080	443	140	86
11	120	120	132	396	2,140	3,350	1,720	1,080	1,000	396	140	86
12	140	120	140	339	1,330	2,860	1,720	1,080	855	490	164	86
13	246	120	101	315	1,080	2,860	1,620	928	788	315	120	101
14	188	164	132	294	788	2,380	1,620	788	659	315	164	101
15	188	120	132	246	622	2,260	1,520	788	544	280	140	86
16	188	120	101	443	855	2,620	1,330	855	490	246	120	70
17	140	140	132	415	1,520	1,920	1,330	928	544	217	120	70
18	164	164	140	380	396	1,720	1,240	1,080	490	188	140	86
19	164	188	120	260	315	1,520	1,080	15,700	443	188	140	70
20	164	188	101	217	720	1,520	1,080	9,100	443	188	140	120
21	188	246	140	246	788	1,420	1,000	6,240	396	188	164	188
22	188	217	188	490	7,080	1,420	928	5,150	396	140	188	70
23	164	217	234	15,400	9,400	3,600	788	3,220	544	140	140	70
24	164	188	234	7,940	5,690	7,650	720	2,740	443	164	188	86
25	164	188	229	4,100	5,150	5,150	659	2,740	490	140	188	70
26	164	178	315	2,260	3,600	3,600	788	2,500	396	188	140	70
27	164	164	396	1,820	2,260	2,980	2,740	2,140	490	188	120	70
28	140	164	372	1,920	1,620	2,740	8,810	1,820	720	217	101	101
29	140	120	315	2,040	2,980	2,140	6,800	1,420	855	188	101	70
30	120	70	315	1,520	....	1,620	5,150	1,240	1,420	164	86	46
31	140	....	490	1,080	....	1,420	....	1,330	....	164	86	....
1904-5.												
1	46	101	101	490	720	1,000	1,920	1,720	1,000	544	659	315
2	46	86	101	544	720	2,140	1,620	1,520	855	1,720	544	396
3	46	58	101	659	720	2,500	1,520	1,330	720	1,420	490	490
4	46	70	101	490	720	2,620	1,330	1,160	598	1,080	396	928
5	46	86	120	460	598	4,620	1,160	1,000	490	2,380	490	720
6	46	70	140	430	490	4,620	2,380	855	490	1,720	598	544
7	58	46	246	396	396	5,150	3,600	1,520	396	1,330	720	443
8	70	70	280	370	246	7,940	3,220	2,140	396	1,520	720	315
9	101	58	217	340	315	1,600	2,860	2,040	315	1,080	544	280
10	86	46	164	315	315	25,600	2,380	1,520	315	855	443	246
11	101	46	140	443	246	18,600	2,140	1,420	315	720	855	246
12	70	70	120	1,240	315	10,900	2,140	28,400	315	598	1,000	246
13	70	70	120	5,420	490	8,230	1,920	21,100	315	8,230	855	396
14	70	70	140	5,690	659	6,240	1,720	10,600	280	12,900	720	315
15	58	101	164	3,350	855	6,240	1,520	7,940	280	8,230	788	315
16	58	101	164	2,380	1,000	5,960	1,330	7,080	356	4,360	928	280
17	46	101	101	1,920	788	5,690	1,240	6,240	315	2,380	1,080	246
18	70	101	101	1,330	598	6,800	1,080	5,150	246	1,720	1,000	217
19	70	101	101	855	598	6,800	1,000	3,850	246	1,240	855	188
20	70	70	140	855	490	7,940	855	2,860	246	928	659	188
21	70	86	120	855	396	10,300	855	2,040	246	855	544	164
22	70	101	120	855	396	15,000	928	1,620	1,330	659	490	140
23	58	101	70	788	855	9,100	1,080	1,420	1,920	3,600	396	140
24	46	101	101	720	855	5,690	1,000	1,160	2,040	6,800	356	140
25	70	101	164	720	1,160	4,360	855	1,000	5,960	3,600	315	140
26	58	101	720	720	1,520	4,100	855	855	3,600	2,260	396	101
27	46	101	2,380	720	1,520	3,600	855	855	2,860	1,520	315	140
28	46	101	2,140	720	1,420	3,100	1,000	788	2,040	1,080	598	120
29	46	101	1,920	720	....	2,620	2,140	720	1,330	1,000	490	101
30	46	86	1,420	720	....	2,380	1,920	855	855	788	443	101
31	46	....	855	720	....	2,140	....	855	....	788	396	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1905-6.												
1	101	396	598	1,520	2,140	598	7,080	1,520	1,000	......	......	......
2	70	280	720	1,330	1,720	544	6,240	1,330	1,000	......	......	......
3	140	280	4,620	5,150	1,330	544	4,620	1,240	928	......	......	......
4	101	246	11,300	14,600	1,080	4,620	3,350	1,720	928	......	......	......
5	101	246	5,420	11,300	928	6,240	2,860	2,500	928	......	......	......
6	101	246	3,100	6,240	1,000	3,600	2,860	2,380	928	......	......	......
7	101	246	2,040	3,850	928	2,380	2,140	2,140	928	......	......	......
8	101	246	1,620	2,860	788	1,920	4,100	2,140	1,720	......	......	......
9	101	315	1,240	2,380	720	1,820	3,600	2,140	1,720	......	......	......
10	101	356	1,080	1,820	788	1,720	1,920	1,920	1,000	......	......	......
11	140	315	855	1,080	720	1,000	5,690	1,720	928	......	......	......
12	188	280	788	1,720	659	1,000	4,360	1,520	928	......	......	......
13	315	246	720	1,520	598	928	3,350	1,160	855	......	......	......
14	246	246	598	4,360	598	1,000	2,620	1,000	855	......	......	......
15	356	188	720	4,360	598	6,520	7,650	855	855	......	......	......
16	246	188	598	4,100	598	13,300	7,940	1,000	855	......	......	......
17	188	188	544	3,600	396	8,230	6,520	1,160	855	......	......	......
18	188	188	544	3,100	315	4,620	3,350	1,330	928	......	......	......
19	164	217	490	2,740	315	3,350	2,980	1,330	1,000	......	......	......
20	140	246	720	2,380	396	4,360	2,620	1,240	1,240	......	......	......
21	140	396	1,000	2,040	443	4,620	2,140	1,160	2,860	......	......	......
22	140	598	9,700	1,720	544	4,100	1,920	1,160	2,260	......	......	......
23	140	544	6,240	21,100	1,420	4,360	1,820	1,080	1,720	......	......	......
24	140	490	4,620	19,300	1,160	4,100	1,520	1,080	1,240	......	......	......
25	164	443	3,600	8,230	1,000	4,100	1,330	1,000	855	......	......	......
26	246	396	2,980	5,420	855	5,420	1,240	855	855	......	......	......
27	720	396	2,140	3,600	788	7,080	1,240	855	598	......	......	......
28	1,620	356	1,720	3,850	720	12,900	3,600	855	490	......	......	......
29	788	356	1,520	3,850	......	11,600	2,260	928	490	......	......	......
30	598	490	1,520	3,100	......	9,700	1,820	928	396	......	......	......
31	598	......	1,520	2,620	......	10,900	......	1,000	......	......	......	......
1907.												
1	......	......	......	......	......	......	......	......	7,360	1,000	855	490
2	......	......	......	......	......	......	......	......	8,230	855	598	396
3	......	......	......	......	......	......	......	......	6,800	788	490	396
4	......	......	......	......	......	......	......	......	4,360	720	396	490
5	......	......	......	......	......	......	......	......	3,350	855	356	490
6	......	......	......	......	......	......	......	......	2,860	720	356	443
7	......	......	......	......	......	......	......	......	2,740	598	315	443
8	......	......	......	......	......	......	......	......	2,260	544	788	396
9	......	......	......	......	......	......	......	......	14,300	598	598	396
10	......	......	......	......	......	......	......	5,960	6,800	544	490	315
11	......	......	......	......	......	......	......	4,620	6,240	2,620	396	598
12	......	......	......	......	......	......	......	3,600	7,650	1,720	598	1,920
13	......	......	......	......	......	......	......	2,860	11,300	1,420	598	2,620
14	......	......	......	......	......	......	......	2,260	41,200	1,920	490	1,420
15	......	......	......	......	......	......	......	1,920	14,300	1,420	356	1,000
16	......	......	......	......	......	......	......	1,720	7,360	1,160	315	720
17	......	......	......	......	......	......	......	1,520	5,690	1,080	246	598
18	......	......	......	......	......	......	......	1,330	3,350	6,240	280	1,000
19	......	......	......	......	......	......	......	1,160	2,500	6,240	246	855
20	......	......	......	......	......	......	......	1,000	1,920	3,100	246	855
21	......	......	......	......	......	......	......	1,000	1,720	2,140	217	720
22	......	......	......	......	......	......	......	855	1,330	1,330	164	598
23	......	......	......	......	......	......	......	788	1,330	1,080	246	659
24	......	......	......	......	......	......	......	720	4,100	855	315	2,620
25	......	......	......	......	......	......	......	720	2,860	855	4,880	3,350
26	......	......	......	......	......	......	......	720	2,860	659	3,600	1,720
27	......	......	......	......	......	......	......	855	2,380	544	2,140	1,160
28	......	......	......	......	......	......	......	855	1,720	490	1,330	855
29	......	......	......	......	......	......	......	855	1,330	490	1,000	720
30	......	......	......	......	......	......	......	788	1,160	598	720	659
31	......	......	......	......	......	......	......	928	......	1,160	598	......

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1907-8.												
1	[illegible]	396	1,520	7,650	1,330	1,520	26,000	2,380	3,100	396	855	443
2	[illegible]	576	1,330	5,420	1,330	5,690	[illegible]	[illegible]	2,140	315	659	[illegible]
3	[illegible]	6,800	[illegible]	[illegible]	1,720	11,600	10,300	[illegible]	1,520	490	[illegible]	315
4	443	4,880	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,520	1,620	443	280
5	[illegible]	2,860	[illegible]	[illegible]	1,330	8,520	[illegible]	2,620	5,150	4,360	396	246
6	[illegible]	2,140	720	2,620	1,000	15,000	[illegible]	2,620	[illegible]	2,860	396	246
7	855	1,720	720	2,260	[illegible]	[illegible]	[illegible]	[illegible]	2,620	3,100	246	246
8	[illegible]	1,920	598	1,720	1,160	22,200	[illegible]	[illegible]	1,920	2,380	[illegible]	217
9	7,940	1,920	855	1,920	1,160	12,300	2,380	[illegible]	1,520	1,420	1,000	217
10	4,100	4,100	[illegible]	1,520	1,160	10,300	[illegible]	[illegible]	1,330	1,000	1,520	188
11	2,380	9,400	[illegible]	1,420	1,000	6,800	5,150	[illegible]	1,160	788	1,520	188
12	1,720	5,960	[illegible]	21,800	1,520	5,150	7,940	6,240	1,000	598	1,000	164
13	1,160	3,850	4,880	21,500	4,100	4,620	[illegible]	4,360	855	490	720	164
14	1,000	2,740	[illegible]	[illegible]	[illegible]	4,620	4,360	[illegible]	720	443	544	164
15	788	1,920	4,100	[illegible]	[illegible]	4,620	3,350	2,620	855	396	490	164
16	720	1,520	[illegible]	4,620	39,600	4,620	4,100	2,140	855	396	396	140
17	598	1,330	[illegible]	[illegible]	[illegible]	[illegible]	6,240	1,720	[illegible]	396	396	140
18	490	1,160	2,380	2,860	[illegible]	8,520	5,150	1,720	720	315	356	140
19	[illegible]	2,260	2,140	2,620	4,620	[illegible]	4,880	2,140	598	315	315	140
20	396	4,100	1,720	2,140	4,100	10,900	5,150	[illegible]	490	315	280	140
21	396	3,600	1,520	1,920	2,860	7,360	4,100	[illegible]	598	188	246	120
22	396	2,860	1,330	2,140	2,380	[illegible]	[illegible]	4,880	720	396	246	140
23	315	3,100	2,260	2,860	2,140	4,360	2,620	[illegible]	490	396	246	140
24	315	7,360	[illegible]	3,350	1,920	4,620	2,140	4,880	490	544	217	120
25	315	8,810	[illegible]	2,380	1,720	4,100	2,040	4,360	1,000	598	246	120
26	315	[illegible]	[illegible]	1,520	1,720	[illegible]	4,100	5,690	720	1,240	1,330	120
27	315	[illegible]	4,360	3,100	1,720	2,860	[illegible]	[illegible]	598	3,600	2,140	101
28	[illegible]	2,860	3,350	4,100	1,520	2,140	3,850	2,860	598	4,620	1,520	101
29	315	2,380	3,350	3,600	1,420	2,500	2,860	2,620	490	3,600	1,000	101
30	315	1,920	7,360	3,100	....	3,100	2,260	4,100	396	1,720	720	101
31	356	....	10,300	2,620	....	[illegible]	....	5,420	....	1,160	[illegible]	....
1908-9.												
1	140	598	246	5,150	1,160	[illegible]	2,860	6,800	1,420	1,000	2,380	140
2	140	[illegible]	217	3,100	788	2,620	2,380	6,800	1,240	1,330	1,160	101
3	140	315	188	2,140	788	2,260	2,140	5,150	1,160	3,100	788	101
4	140	[illegible]	188	1,720	1,160	4,880	2,140	3,850	1,160	1,520	598	188
5	120	217	188	2,860	1,160	4,620	2,040	3,100	1,520	1,000	490	164
6	140	188	164	11,300	1,160	3,600	3,100	2,500	1,720	[illegible]	396	140
7	140	188	[illegible]	7,360	1,160	3,600	3,100	1,920	1,330	3,600	396	140
8	140	188	598	4,620	1,160	[illegible]	2,620	1,820	1,080	2,140	315	188
9	140	188	[illegible]	2,860	1,000	7,080	2,140	1,720	1,240	1,330	315	188
10	140	140	[illegible]	[illegible]	[illegible]	6,800	1,720	2,500	1,520	855	188	188
11	164	188	490	1,720	12,300	8,230	1,520	5,690	2,140	[illegible]	246	217
12	140	164	1,920	1,520	[illegible]	5,690	1,330	4,620	1,520	598	246	188
13	140	164	2,620	1,330	4,360	4,100	1,160	3,220	1,160	490	217	188
14	140	164	1,720	1,240	4,360	4,100	9,700	2,380	1,000	396	188	188
15	140	[illegible]	1,160	1,520	[illegible]	3,600	15,000	1,920	855	396	246	188
16	140	140	[illegible]	[illegible]	[illegible]	2,860	7,080	1,720	720	396	[illegible]	246
17	140	140	720	10,300	[illegible]	2,380	4,620	1,420	720	356	[illegible]	544
18	140	140	[illegible]	[illegible]	[illegible]	2,040	[illegible]	1,160	1,000	[illegible]	720	[illegible]
19	[illegible]	217	[illegible]	[illegible]	4,100	1,720	2,620	1,080	1,160	[illegible]	544	246
20	140	315	1,520	[illegible]	[illegible]	1,520	2,140	928	1,330	246	[illegible]	246
21	[illegible]	396	1,330	[illegible]	4,100	1,520	1,920	855	1,000	246	356	188
22	120	443	1,000	[illegible]	[illegible]	1,720	2,140	5,150	[illegible]	217	246	188
23	[illegible]	[illegible]	[illegible]	[illegible]	4,880	2,040	4,880	5,420	[illegible]	246	246	164
24	[illegible]	[illegible]	720	[illegible]	4,880	2,860	8,520	3,350	[illegible]	246	[illegible]	[illegible]
25	[illegible]	315	[illegible]	[illegible]	[illegible]	3,850	6,520	[illegible]	[illegible]	[illegible]	[illegible]	164
26	[illegible]	315	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4,100	720	[illegible]	[illegible]	164
27	217	[illegible]	1,520	[illegible]	[illegible]	[illegible]	[illegible]	7,080	598	188	[illegible]	188
28	246	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,860	[illegible]	[illegible]	188	188	[illegible]
29	246	246	[illegible]	[illegible]	....	[illegible]	2,860	3,600	[illegible]	[illegible]	164	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	3,100	2,380	1,000	246	140	140
31	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		246	[illegible]	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909-10.												
1..........	140	315	315	490	1,000	5,420	659	2,380	855	884	315	246
2..........	140	280	280	490	855	11,300	598	1,820	828	747	301	246
3..........	140	246	246	788	1,000	6,240	2,400	1,480	788	696	280	544
4..........	120	246	246	5,560	1,330	5,690	884	1,300	747	659	246	1,240
5..........	101	217	246	4,100	1,720	4,360	1,240	1,190	928	788	331	1,820
6..........	101	188	246	2,620	1,520	3,600	1,160	971	3,850	884	380	1,720
7..........	101	188	246	5,150	1,160	3,350	1,160	855	5,820	1,080	315	1,330
8..........	101	188	315	8,380	855	3,100	971	928	3,480	1,030	301	928
9..........	86	217	396	4,620	855	2,620	884	1,190	2,380	1,240	246	659
10..........	86	246	490	3,350	1,160	2,140	828	1,240	2,420	1,190	246	512
11..........	315	720	246	2,860	1,160	1,920	720	1,190	6,520	928	217	443
12..........	855	1,720	396	1,330	720	1,720	788	1,160	8,960	747	200	380
13..........	1,520	1,240	396	1,160	855	1,720	1,880	1,520	10,900	1,620	217	396
14..........	1,080	855	9,700	1,330	855	1,920	2,140	2,260	13,900	2,620	178	512
15..........	659	720	6,240	1,160	1,000	2,100	1,970	1,920	8,810	2,100	246	490
16..........	490	598	3,600	1,000	1,330	1,920	1,620	1,620	14,000	1,920	280	380
17..........	396	490	2,260	855	4,100	1,680	1,520	1,300	34,500	1,560	246	315
18..........	396	443	1,520	855	14,300	1,420	1,880	1,240	11,600	2,900	178	260
19..........	396	396	1,160	3,100	10,900	1,300	2,140	1,190	6,240	4,880	188	246
20..........	315	396	1,520	5,420	5,420	1,130	2,260	1,160	7,710	2,570	188	200
21..........	246	396	1,000	4,100	3,850	1,000	2,380	1,160	5,150	1,620	178	188
22..........	246	315	1,000	14,500	3,850	1,000	2,380	1,620	3,980	1,190	217	188
23..........	217	315	720	7,080	5,960	928	2,260	1,540	3,900	928	178	178
24..........	598	315	598	4,360	4,620	928	2,500	1,480	4,490	788	696	178
25..........	598	396	544	3,100	3,600	855	3,480	1,480	2,860	598	443	164
26..........	490	396	490	2,140	2,860	855	3,150	1,480	1,920	490	396	260
27..........	598	396	490	1,920	2,860	855	2,860	1,330	1,420	490	301	1,420
28..........	490	356	443	1,720	3,100	855	3,220	1,190	1,330	490	246	788
29..........	396	315	396	1,720	....	696	3,220	971	1,190	415	200	1,330
30..........	396	315	396	1,330	....	720	2,810	884	1,030	396	178	747
31..........	315	....	598	1,160	....	720	....	855	....	380	188	....
1910-11.												
1..........	512	260	720	5,690	9,100	2,140	3,850	1,720	828	260	101	3,220
2..........	380	260	576	11,600	7,080	1,920	3,480	1,720	696	234	86	2,140
3..........	356	246	443	23,000	5,420	1,720	4,100	1,480	598	380	86	1,030
4..........	315	246	396	23,100	4,620	1,480	7,360	1,300	512	380	95	747
5..........	246	200	443	10,300	3,980	1,240	17,800	1,130	512	301	380	622
6..........	200	188	443	4,620	3,220	5,690	16,400	1,000	855	280	164	512
7..........	246	188	396	3,350	2,860	8,520	9,100	855	622	246	140	380
8..........	246	188	331	2,380	2,620	5,690	6,800	855	659	415	188	315
9..........	200	188	315	1,820	4,100	4,360	9,100	855	971	315	331	246
10..........	622	188	415	1,420	5,690	6,800	8,230	855	928	280	315	928
11..........	622	178	396	1,160	4,360	9,400	5,690	828	659	471	188	828
12..........	471	150	356	1,370	3,220	7,360	4,360	788	544	396	188	720
13..........	356	164	356	1,620	2,740	5,150	3,600	720	490	315	415	1,560
14..........	301	164	380	8,520	2,140	5,690	3,350	622	443	301	443	928
15..........	234	164	200	5,960	1,920	5,150	9,700	576	576	260	396	659
16..........	217	164	315	4,620	1,620	4,100	8,520	544	471	234	356	855
17..........	217	164	315	3,600	1,370	3,600	5,960	512	443	234	280	3,850
18..........	188	188	260	2,740	1,300	3,100	4,360	380	396	188	217	2,620
19..........	188	188	356	2,140	1,160	2,980	3,480	471	396	164	188	1,520
20..........	200	164	315	1,720	1,680	6,240	4,880	471	315	150	140	1,030
21..........	178	164	443	1,920	1,720	6,800	5,690	396	356	140	140	788
22..........	178	150	490	3,100	1,420	4,880	5,420	396	356	140	120	622
23..........	188	150	396	8,520	1,240	3,720	4,360	443	490	140	101	576
24..........	246	178	544	5,960	1,130	3,220	3,850	490	396	150	109	490
25..........	234	150	1,370	3,980	1,240	2,620	3,220	396	315	140	109	443
26..........	246	164	1,420	3,220	1,330	2,140	2,860	331	315	109	109	331
27..........	260	331	1,240	3,850	1,520	2,740	2,380	356	356	101	132	280
28..........	246	396	1,030	5,690	1,720	5,150	2,040	315	443	101	101	315
29..........	217	598	1,160	6,800	....	4,100	1,720	512	396	120	120	315
30..........	246	788	6,940	35,100	....	3,850	1,720	855	315	120	132	380
31..........	246	....	8,660	19,300	....	4,100	....	1,000	....	101	217	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911-12.												
1	315	[illegible]	1,480	10,000	[illegible]	4,100	5,960	2,740	501	1,330	499	183
2	[illegible]	598	[illegible]	[illegible]	2,980	2,860	7,940	[illegible]	481	942	396	178
3	[illegible]	544	1,230	4,620	2,380	2,500	9,700	1,920	[illegible]	696	347	154
4	1,130	490	[illegible]	[illegible]	1,560	2,040	[illegible]	[illegible]	415	587	415	145
5	[illegible]	415	928	2,620	1,480	1,720	4,880	1,390	[illegible]	1,060	380	120
6	[illegible]	720	842	1,620	[illegible]	1,560	3,600	1,300	364	1,720	301	117
7	747	10,300	801	1,160	1,330	1,400	3,100	1,030	331	1,050	287	117
8	598	[illegible]	774		1,080	1,640	2,860	2,980	287	913	253	128
9	3,850	[illegible]	774		1,300	[illegible]	2,380	2,620	240	683	[illegible]	109
10	2,380	2,740	720		928	[illegible]	2,140	2,260	246	555	211	101
11	[illegible]	2,040	720		942	[illegible]	1,920	1,920	188	587	188	109
12	1,680	1,680	720		788	2,860	1,640	10,600	188	842	205	95
13	1,680	2,140	708	700	801	[illegible]	1,480	[illegible]	205	708	200	76
14	1,420	2,140	720		720	7,940	1,310	9,700	188	533	217	73
15	1,190	1,920	734		683	10,900	1,230	5,960	211	671	188	76
16	4,100	1,700	814		659	31,100	1,140	10,000	194	696	159	73
17	3,720	1,480	1,190		671	11,900	1,230	18,200	194	471	140	68
18	18,200	1,480	1,820		720	6,800	2,140	8,230	217	443	150	79
19	10,300	[illegible]	1,720	1,330	956	5,150	3,480	4,880	331	471	174	260
20	5,150	3,850	1,520	2,380	1,370	4,620	2,980	3,600	415	396	164	164
21	2,860	2,620	1,310	2,140	[illegible]	5,690	2,260	2,620	405	696	140	109
22	1,920	2,140	1,300	[illegible]	16,800	5,960	1,920	2,040	356	544	164	95
23	2,380	1,620	5,420	1,720	9,100	5,150	1,820	1,620	490	481	159	178
24	3,100	1,500	4,620	1,720	5,150	7,940	1,920	1,370	396	1,700	140	2,980
25	2,140	1,520	5,690	2,040	[illegible]	12,600	1,820	1,180	555	555	136	2,260
26	1,720	[illegible]	4,880	[illegible]	[illegible]	8,810	1,680	1,020	544	6,800	145	1,400
27	1,420	1,520	5,690	1,820	17,800	6,960	1,820	913	544	2,620	140	942
28	1,190	[illegible]	6,800	1,620	10,300	4,360	2,500	788	2,040	1,420	117	598
29	971	1,440	4,620	2,140	5,960	17,500	2,380	720	1,920	913	105	471
30	828	1,520	3,480	[illegible]	....	16,800	2,740	696	1,680	671	113	405
31	720	....	3,720	5,150	....	8,810	....	587	....	533	136	....
1912-13.												
1	347	223	183	9,700	3,350	4,880	3,350	1,190	5,150	533	415	246
2	301	217	217	4,620	3,480	3,850	2,620	1,080	3,480	622	356	246
3	246	200	246	2,740	3,220	2,860	2,140	971	2,620	434	512	178
4	240	194	356	4,620	7,360	2,140	1,820	913	5,690	1,000	364	183
5	205	188	490	4,100	7,080	1,920	1,620	855	5,150	1,420	301	159
6	183	188	1,160	3,480	4,620	1,720	1,400	801	3,100	1,230	253	178
7	188	315	2,620	7,360	3,220	[illegible]	1,190	1,100	2,140	1,330	223	140
8	178	5,690	2,140	14,300	2,140	1,130	1,060	1,180	3,100	986	188	150
9	169	3,980	1,520	13,600	1,680	870	986	1,020	2,980	696	178	140
10	164	2,140	1,130	[illegible]	1,540	[illegible]	913	884	2,260	[illegible]	164	140
11	159	1,440	884	4,620	1,540	[illegible]	913	774	1,700	[illegible]	217	124
12	150	1,060	747	[illegible]	1,820	[illegible]	2,500	671	1,300	3,350	260	124
13	145	828	610	[illegible]	[illegible]	4,100	19,300	610	1,140	2,140	308	140
14	[illegible]	696	415	[illegible]	1,160	10,000	11,900	598	971	[illegible]	2,860	113
15	200	598	331	2,980	1,030	17,100	17,100	576	828	1,080	2,740	117
16	188	533	452	2,380	[illegible]	[illegible]	12,900	544	696	928	1,260	136
17	178	481	555	[illegible]	1,130	[illegible]	7,940	622	622	[illegible]	788	120
18	159	[illegible]	501	1,320	971	4,360	5,150	747	555	734	555	136
19	183	[illegible]	471	1,600	842	3,220	[illegible]	1,260	490	610	576	145
20	[illegible]	356	452	[illegible]	774	2,620	3,100	1,370	443	855	[illegible]	132
21	[illegible]	[illegible]	315	[illegible]	801	2,140	2,500	[illegible]	[illegible]	1,130	[illegible]	183
22	[illegible]	[illegible]	234	1,260	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	471	294
23	331	280	178	1,240	1,080	1,620	[illegible]	[illegible]	356	622	[illegible]	331
24	[illegible]	274	217	1,370	1,400	[illegible]	[illegible]	[illegible]	[illegible]	587	[illegible]	443
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,230	[illegible]	7,360	364	512	1,240	[illegible]
26	[illegible]	[illegible]	253	[illegible]	1,140	[illegible]	[illegible]	[illegible]	[illegible]	747	[illegible]	[illegible]
27	[illegible]	[illegible]	[illegible]	[illegible]	1,370	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	3,980	[illegible]	[illegible]	15,700	[illegible]	490	[illegible]	[illegible]
29	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	622	[illegible]	388	183
30	[illegible]	[illegible]	[illegible]	[illegible]	....	[illegible]	[illegible]	[illegible]	512	[illegible]	[illegible]	164
31	[illegible]	....	[illegible]	[illegible]	....	4,360	....	[illegible]		[illegible]	[illegible]	

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913-14.												
1	183	828	2,620	1,820	12,300	2,860	4,880	2,380	287	280	260	512
2	164	696	6,520	1,620	6,800	2,500	5,690	2,040	294	246	200	405
3	178	598	5,150	1,620	4,100	1,920	8,520	1,720	274	234	200	315
4	169	533	3,480	1,440	3,220	1,720	6,240	1,500	246	223	188	287
5	211	481	2,500	1,370	2,620	2,140	4,360	1,480	301	188	164	246
6	194	434	2,040	1,300	2,620	2,140	3,350	2,040	287	183	140	223
7	287	380	2,040	1,230	6,800	1,920	2,740	3,220	260	164	159	200
8	246	415	3,850	1,230	8,520	1,720	2,380	2,860	246	188	260	211
9	234	884	3,480	1,920	5,420	1,680	6,520	2,620	280	234	194	188
10	217	3,980	2,620	4,100	3,850	1,480	5,690	2,140	287	246	260	169
11	331	3,350	2,260	4,100	3,100	2,380	3,850	1,820	240	223	246	217
12	671	2,380	1,820	3,480	2,380	1,920	3,100	1,560	217	178	331	356
13	576	2,140	1,480	2,860	1,920	3,480	2,500	1,370	200	200	380	471
14	490	3,480	1,230	2,380	1,240	2,860	1,920	1,210	183	1,000	347	452
15	396	9,700	1,160	2,140	1,190	3,350	2,140	1,080	194	720	315	380
16	364	11,900	1,030	1,820	1,230	6,240	6,800	971	169	544	331	260
17	323	14,300	942	1,480	1,130	11,300	7,080	842	164	533	301	200
18	308	8,230	842	1,300	1,190	13,300	5,150	774	188	610	240	150
19	280	4,880	814	1,300	3,100	9,100	3,980	720	169	443	211	95
20	364	3,350	747	1,240	14,000	5,960	4,880	622	169	347	194	101
21	1,720	2,500	708	5,690	8,810	4,100	7,360	587	159	301	159	101
22	2,140	1,820	696	9,700	5,420	3,480	5,420	544	164	301	150	101
23	1,480	1,480	720	5,150	5,420	3,220	4,100	512	140	260	140	105
24	1,240	1,190	708	3,850	4,880	3,220	3,220	490	140	211	124	101
25	5,150	971	801	9,100	3,600	3,350	2,620	452	159	183	132	101
26	7,080	855	2,860	8,230	3,100	5,690	2,740	424	183	183	164	120
27	4,880	760	6,240	5,420	2,980	10,900	12,600	405	234	211	274	124
28	2,860	828	3,720	3,980	2,860	9,400	6,240	364	659	178	396	109
29	1,920	2,040	2,860	3,350	....	9,100	4,360	364	415	169	1,130	113
30	1,390	2,380	2,620	3,480	....	6,800	3,100	323	315	211	659	109
31	1,030	....	1,920	4,100	....	5,420	....	308	....	253	659	....
1914-15.												
1	64	218	169	4,490	4,490	2,500	804	1,250	204	185	137	463
2	66	185	547	3,710	27,800	2,090	777	1,080	516	169	133	394
3	66	169	1,250	2,810	24,800	1,700	725	1,000	626	185	126	345
4	69	158	1,420	1,510	15,200	1,420	686	1,160	7,500	204	536	394
5	72	164	1,990	1,080	6,120	1,420	649	1,160	5,300	268	916	725
6	90	153	5,300	1,510	5,850	1,340	637	1,000	2,810	336	637	1,000
7	92	142	3,030	26,300	7,500	1,420	592	832	1,990	336	536	818
8	92	126	2,190	16,700	6,680	1,510	686	777	1,420	355	394	637
9	97	133	1,790	11,600	5,580	1,340	930	699	1,160	374	311	526
10	92	115	1,700	9,800	3,960	1,340	1,080	649	902	302	302	432
11	100	118	1,700	7,500	3,250	1,600	1,000	581	712	239	253	336
12	118	111	1,890	6,400	2,600	1,790	1,160	526	592	211	246	277
13	111	115	1,890	6,400	2,190	1,790	1,080	526	526	197	260	260
14	122	115	1,890	5,580	1,600	1,510	1,250	484	615	190	364	253
15	239	122	1,890	3,480	3,480	1,420	1,080	484	1,600	185	790	294
16	403	122	1,890	4,220	7,780	1,420	930	463	1,700	197	604	232
17	1,080	218	1,890	5,300	5,300	1,600	874	442	1,510	153	818	190
18	860	311	1,790	11,600	3,480	1,510	777	413	2,090	137	637	174
19	637	253	1,990	14,900	2,600	1,420	725	345	1,990	122	526	158
20	581	286	4,490	13,400	1,990	1,160	673	355	1,340	197	818	164
21	432	253	8,600	9,500	1,700	1,160	660	355	874	260	604	345
22	374	185	8,900	6,680	1,510	1,080	712	336	660	204	463	660
23	311	185	8,050	5,850	1,340	930	764	403	484	185	526	930
24	239	158	7,220	5,300	3,250	860	558	463	452	355	570	738
25	239	118	6,400	5,850	12,800	818	526	442	384	268	442	526
26	268	137	5,580	6,120	6,950	790	604	474	294	204	345	384
27	286	153	4,760	5,850	4,220	832	581	484	246	174	302	374
28	345	142	5,300	5,030	3,030	874	592	463	211	211	277	336
29	320	164	5,850	3,710	....	860	712	452	190	190	294	294
30	294	190	6,120	3,030	....	888	1,250	452	179	169	423	268
31	225	....	6,120	2,810	....	902	....	239	....	158	547	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915-16.												
1	9,800	253	649	5,030	5,850	2,190	3,030	1,890	1,250	516	790	294
2	18,500	253	581	3,710	8,050	2,090	2,290	1,600	1,000	581	7,220	268
3	6,400	239	570	4,490	6,400	2,810	2,090	1,340	1,000	777	3,480	253
4	3,250	211	526	3,710	4,220	2,810	1,890	1,250	1,000	699	1,890	232
5	2,090	197	474	2,600	3,250	2,500	1,700	1,160	1,160	1,000	1,510	204
6	1,600	185	403	2,290	3,030	3,250	1,700	1,080	930	818	1,700	190
7	1,160	190	423	2,090	2,810	5,300	2,090	930	1,000	452	1,700	190
8	1,000	204	328	1,990	3,710	2,390	2,190	860	526	452	2,290	190
10	673	190	442	1,340	3,960	4,760	2,190	846	2,810	463	1,890	204
10	673	190	442	1,340	3,060	4,760	2,190	846	2,810	463	1,890	204
11	626	190	384	4,220	3,480	3,250	5,300	704	2,500	673	1,510	232
12	547	190	328	13,400	3,030	2,600	6,680	712	2,090	790	1,420	185
13	494	179	311	11,000	3,250	2,190	5,850	660	1,600	615	1,340	169
14	442	185	336	8,600	4,220	2,190	4,220	592	1,250	484	1,250	164
15	423	218	403	5,300	3,710	3,710	3,250	581	3,710	452	902	232
16	384	364	328	3,710	2,810	3,030	2,500	547	6,680	526	1,600	1,250
17	364	738	403	2,810	2,500	3,480	2,090	536	12,200	2,390	2,390	860
18	336	916	902	2,190	2,090	2,600	1,700	558	8,050	3,480	1,990	660
19	364	874	12,500	1,600	1,790	2,090	3,710	558	4,220	2,290	1,340	463
20	403	1,890	5,850	1,160	1,420	1,890	1,340	526	2,810	1,420	1,340	355
21	413	2,090	3,480	1,340	1,340	1,510	1,160	484	1,990	1,080	1,000	277
22	432	1,700	2,290	1,510	1,340	1,600	1,250	452	1,510	1,160	790	225
23	474	1,340	1,790	1,790	1,250	3,710	1,160	686	3,250	3,030	2,810	232
24	432	1,160	1,510	1,890	1,340	5,030	1,160	2,600	1,080	1,890	1,890	232
25	384	1,000	1,160	1,510	6,400	3,480	1,250	2,500	1,080	1,420	1,080	197
26	345	846	1,420	1,600	7,500	2,600	2,390	1,790	1,340	1,080	804	225
27	336	790	1,790	1,990	4,490	2,190	3,250	5,580	930	846	592	232
28	302	764	1,890	2,810	3,250	2,290	3,250	2,500	860	1,160	505	190
29	302	764	7,500	3,030	2,500	6,120	2,810	1,600	686	1,600	452	860
30	294	712	18,500	6,120	....	5,580	2,290	1,340	592	1,160	394	2,810
31	253	....	8,320	6,950	....	3,960	....	1,420	....	874	328	....
1916-17.												
1	2,190	328	558	2,500	6,120	12,800	1,700	3,710	2,600	179	345	82
2	1,250	311	615	1,990	6,400	11,300	1,510	4,490	2,090	218	302	87
3	860	286	649	1,790	4,220	12,500	1,420	3,250	2,090	211	846	82
4	637	277	592	2,390	2,390	27,200	1,340	2,290	2,390	239	374	79
5	536	260	547	5,580	1,790	24,800	1,340	1,990	2,390	225	277	84
6	463	260	547	10,400	1,510	9,800	5,580	1,790	2,090	218	302	90
7	394	246	536	8,600	1,420	6,120	6,950	1,420	1,700	197	277	92
8	345	232	494	5,030	1,420	5,580	5,030	1,420	1,420	174	246	169
9	320	225	526	3,480	1,420	11,600	5,030	1,990	1,160	158	286	218
10	294	218	494	2,600	1,080	7,500	3,480	3,030	930	137	311	336
11	277	232	494	2,090	916	4,760	2,810	2,810	930	137	336	649
12	260	225	479	1,600	888	9,800	2,390	2,390	902	133	345	423
13	260	239	463	1,080	902	20,600	2,390	2,090	764	137	268	311
14	239	253	448	1,890	738	17,600	2,390	1,790	649	122	218	225
15	260	260	432	3,030	777	14,300	2,090	1,510	581	118	185	185
16	225	239	526	2,810	846	8,900	1,790	1,250	526	153	174	158
17	260	204	277	2,190	790	10,100	1,510	1,080	474	246	148	133
18	345	225	442	1,790	930	11,600	1,340	1,000	452	260	133	122
19	505	218	442	1,600	1,420	7,500	1,160	874	413	302	133	118
20	1,420	185	442	1,420	3,710	5,030	1,080	790	384	516	122	104
21	1,420	179	442	1,340	7,500	3,960	1,000	725	442	432	115	100
22	1,080	190	725	6,400	5,300	6,120	930	673	505	374	115	95
23	860	204	2,190	13,700	4,220	6,400	902	686	463	463	107	97
24	712	225	2,190	6,680	12,200	14,600	804	673	364	604	100	92
25	604	328	1,890	4,220	12,800	13,700	777	649	311	874	97	90
26	558	902	1,420	3,030	6,950	7,220	790	615	277	3,030	97	90
27	463	673	1,340	2,390	4,490	4,760	874	1,250	253	1,700	100	95
28	432	526	2,810	1,890	4,220	3,480	818	12,500	232	1,080	97	130
29	294	494	15,200	1,790	....	2,810	902	8,050	218	738	90	164
30	345	526	8,050	2,290	....	2,500	2,600	5,580	204	526	84	225
31	355	....	3,480	3,250	....	1,990	....	3,480	....	423	74	....

NOTE.——Daily discharge interpolated or estimated because of ice from observer's notes, climatic data or by comparison with records for other stations as follows: Jan. 3, Feb. 13-16, Dec. 31, 1899; Jan. 1-6, 1900; Jan. 5-6, 8-9, 1905; Jan. 8-18, 1912; and Dec. 12-14, 1916.

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1918-1922.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917-18.												
1	232	2,600	403	1,160	3,250	5,580	1,660	3,290	1,430	6,280	2,090	3,970
2	190	1,510	394	1,000	2,390	6,400	1,500	2,690	1,200	4,830	1,660	1,910
3	164	1,080	423	832	2,090	5,030	1,580	2,280	1,060	3,290	1,200	1,430
4	158	860	394		1,990	3,480	1,820	2,090	905	2,280	905	1,060
5	148	686	384		1,790	5,850	1,740	1,910	760	1,740	676	816
6	126	592	394		1,600	7,780	1,580	1,740	774	1,430	511	980
7	118	516	374		1,600	10,400	1,500	1,580	905	1,200	449	1,360
8	107	463	336	560	3,480	9,200	1,660	1,580	1,130	980	353	1,430
9	107	423	311		3,960	5,580	12,700	1,660	980	830	307	1,280
10	104	384	204		10,700	4,490	10,900	2,580	816	746	279	1,060
11	100	345	174		12,500	3,960	8,020	2,180	662	662	273	905
12	111	311	153	832	11,300	3,250	7,730	1,910	474	606	307	718
13	114	294		1,080	12,200	15,200	6,280	1,740	371	690	344	606
14	114	277		1,080	15,200	48,000	5,700	1,910	362	718	606	524
15	114	253		1,420	12,500	16,000	9,180	2,480	336	634	1,360	499
16	114	246		1,250	15,500	10,300	9,470	2,690	314	524	980	620
17	114	232		1,250	8,600	6,860	7,440	2,280	578	592	620	524
18	114	218	150	1,160	5,300	4,540	5,700	1,910	905	676	606	704
19	114	204		1,080	3,710	3,420	4,540	2,180	2,920	1,060	905	7,730
20	294	197		930	9,500	2,690	3,970	1,910	2,920	2,090	1,360	3,420
21	1,000	190			16,100	2,580	9,760	2,090	1,820	1,740	1,360	2,380
22	874	190			7,500	8,310	11,500	2,180	1,500	1,200	980	2,380
23	592	179	403		4,760	6,570	7,440	2,920	2,090	830	732	2,000
24	494	174	494	690	3,710	4,540	5,120	2,800	1,660	662	606	1,660
25	463	158	660		3,480	4,250	4,540	2,380	1,360	537	980	1,360
26	403	158	874		13,100	3,970	4,540	6,280	17,600	449	1,200	1,130
27	423	158	1,340	930	14,900	3,290	6,860	6,280	10,000	1,130	830	980
28	516	153	1,600	7,500	7,220	2,690	7,730	3,690	4,830	774	662	816
29	660	148	1,510	11,000	....	2,280	5,410	2,690	5,120	564	606	704
30	3,030	225	1,340	6,950	....	2,000	3,970	2,280	9,470	524	578	606
31	4,760	....	1,250	4,490	....	1,740	....	1,820	....	1,280	537	....
1918-19.												
1	537	10,900	3,290	16,000	1,740	4,250	2,800	1,660	1,360	2,090	732	461
2	474	5,990	2,480	39,400	1,430	6,280	2,380	7,730	1,740	1,580	1,740	788
3	402	3,160	2,180	21,900	1,360	4,540	2,000	5,990	1,360	1,280	1,500	606
4	371	2,180	1,740	10,600	1,360	3,420	1,820	3,970	1,130	1,280	1,130	402
5	336	1,820	1,580	5,990	1,430	2,920	1,740	2,920	980	980	830	321
6	314	1,660	1,430	4,540	1,360	3,160	1,660	2,380	905	830	905	266
7	307	1,500	1,280	3,690	1,130	3,690	1,500	2,090	788	2,920	1,130	227
8	286	1,360	1,200	3,040	1,060	3,290	1,430	2,090	746	3,160	905	216
9	279	1,200	1,130	2,480	1,060	3,420	1,360	6,280	690	2,000	732	190
10	279	1,060	1,280	2,180	980	6,280	1,280	14,800	606	1,280	606	210
11	286	980	2,180	1,740	830	5,120	1,280	11,500	620	980	474	221
12	279	905	4,540	1,820	760	3,690	7,730	6,570	788	830	461	210
13	260	830	4,540	1,740	905	2,920	5,990	4,250	830	1,500	461	232
14	238	760	3,420	1,660	1,500	2,480	3,970	3,690	905	3,040	1,060	190
15	243	676	11,800	1,740	2,180	2,180	3,040	4,830	905	4,540	980	200
16	273	718	9,760	1,740	2,180	1,820	2,280	4,540	1,200	8,020	704	195
17	286	732	5,410	1,740	1,910	1,660	4,540	3,420	1,500	11,200	578	176
18	286	1,360	4,250	4,540	1,660	1,820	5,120	3,970	2,480	6,280	564	167
19	254	2,280	2,920	9,760	1,500	2,180	3,690	3,420	2,380	4,540	524	151
20	286	2,280	2,380	6,570	1,430	2,280	2,800	2,800	1,660	13,900	437	167
21	300	2,000	2,090	4,540	1,360	2,090	2,380	4,250	2,000	8,310	437	171
22	381	1,740	8,310	3,420	1,580	1,820	2,000	5,120	2,380	5,990	391	185
23	425	1,500	17,600	3,290	2,920	1,660	1,820	3,970	1,580	5,120	336	205
24	592	1,360	8,600	12,700	3,970	1,660	1,820	3,160	1,360	5,120	307	216
25	816	1,130	6,280	9,470	3,420	1,500	1,740	8,020	4,540	2,920	293	221
26	6,570	1,060	5,410	5,700	8,310	1,360	1,660	7,440	8,020	2,180	300	216
27	5,990	980	4,250	3,970	7,440	1,745	1,500	4,250	13,900	1,660	371	300
28	3,420	1,130	3,160	3,040	4,540	13,600	1,430	3,160	8,890	1,360	273	232
29	2,480	6,280	2,580	2,580	....	7,440	1,360	2,480	5,120	1,200	232	210
30	3,290	5,120	2,090	2,180	....	4,830	1,360	2,000	2,920	980	227	176
31	24,100	....	2,180	1,820	....	3,690	....	1,660	....	830	266	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1918-1922—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20												
1	[illegible]	[illegible]	[illegible]		[illegible]	1,740	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	221	[illegible]
4	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	314
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	195	[illegible]
6	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,280	232	[illegible]
8	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	210	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,060	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	830	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	314	[illegible]
12	[illegible]	[illegible]	[illegible]	3,160	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,910	362	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,500	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,130	1,360	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,060	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	774	690	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	676	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	830	1,500	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	620	1,910	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3,040	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,090	[illegible]
24	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	307	1,580	[illegible]
25	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,360	[illegible]
26	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,060	[illegible]
27	[illegible]	[illegible]	860	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	830	[illegible]
28	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	690	[illegible]
29	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31	[illegible]			[illegible]		[illegible]		[illegible]		[illegible]	[illegible]	
1920-21												
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	95
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	227	97
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	511	117
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	144
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	140
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	321	133
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	381	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	314	205
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	200	1,200
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	550
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	321
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	167	298
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	158	266
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	227
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	205
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	449	195
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	190
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	314	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	243	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	195	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	171	227
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	151	200
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	140	185
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	120	221
29	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	106	176
31	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]		[illegible]	[illegible]	

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1918-1922—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1921-22.												
1..........	176	17,900	4,830	1,130	1,280	2,280	4,540	1,820	1,500	1,740	402	402
2..........	190	9,180	3,160	980	2,090	3,040	4,540	1,580	1,280	1,500	449	486
3..........	176	3,970	4,830	980	5,410	12,700	3,690	1,580	1,580	1,580	486	830
4..........	176	2,280	5,120	1,130	4,250	8,600	2,920	2,690	1,660	2,090	425	1,430
5..........	176	1,580	4,830	1,430	3,290	5,410	2,280	8,020	1,740	7,150	362	1,580
6..........	176	1,280	3,690	1,580	2,580	3,690	2,000	9,180	2,920	4,540	321	1,130
7..........	176	980	3,160	1,500	2,280	5,700	1,740	6,280	2,800	2,690	273	718
8..........	167	802	2,800	1,280	1,740	10,300	1,580	4,540	2,090	1,910	260	550
9..........	180	704	2,580	1,280	1,500	7,440	1,430	3,420	1,740	1,430	300	402
10..........	200	830		1,130	2,090	10,600	1,360	2,380	1,580	1,060	344	293
11..........	190	1,130		1,130	4,540	12,400	1,280	2,000	1,430	816	449	200
12..........	171	1,280		1,060	9,180	8,310	1,130	1,740	3,970	662	362	254
13..........	162	1,130	720	1,060	8,020	6,570	1,060	1,580	5,410	524	300	238
14..........	154	980		1,060	5,120	5,120	1,280	1,280	3,420	486	254	249
15..........	147	830		1,060	3,290	7,440	2,380	1,200	2,480	760	286	216
16..........	137	718		1,060	2,690	13,900	5,120	1,200	2,090	620	550	238
17..........	126	662	1,280	1,280	2,480	8,890	3,970	1,130	1,740	578	1,500	227
18..........	120	2,180	3,290	2,280	2,480	5,700	2,920	2,920	1,580	1,130	830	200
19..........	114	2,480	12,400	8,600	2,920	4,540	2,580	5,990	1,280	1,740	760	176
20..........	108	3,970	7,440	8,890	6,860	3,160	3,040	4,540	2,090	1,200	449	158
21..........	103	5,120	4,250	8,310	20,700	2,690	2,690	2,920	2,920	980	321	158
22..........	100	3,420	2,690	13,900	14,500	2,280	2,480	1,820	1,820	802	286	151
23..........	106	2,480	8,600	10,600	9,180	2,000	2,280	1,740	1,580	718	254	151
24..........	114	2,000	17,600	7,150	5,990	1,820	1,910	1,910	1,430	905	260	144
25..........	126	1,580	18,200	3,970	4,250	1,740	1,740	1,740	1,130	662	1,500	137
26..........	120	1,430	12,700	2,800	3,160	1,580	1,660	1,580	760	524	2,690	130
27..........	117	1,910	8,890	2,280	2,690	1,910	1,580	1,740	3,420	402	1,740	126
28..........	111	3,970	5,120	1,820	2,480	7,440	1,580	3,160	3,690	524	1,130	123
29..........	103	16,700	3,040	1,580	....	10,000	2,280	2,580	2,380	718	802	123
30..........	108	9,180	1,910	1,430	....	6,860	2,000	2,180	2,000	578	662	123
31..........	371	....	1,430	1,280	....	3,970	....	1,820	....	449	524	....

NOTE.—Stage-discharge relation affected by ice Dec. 13-22, 1917, Jan. 4-11, 21-26, 1918, Dec. 24, 1919, to Jan. 8, 1920, and Dec. 10-16, 1921; mean discharge estimated by study of weather records. Afternoon gage reading of Dec. 31, 1917, increased 1 foot as it was obviously too low.

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1923.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1..........	117	137	106	2,280	4,830	1,130	1,360	1,060	732	344	2,920	195
2..........	117	130	123	11,200	17,600	1,360	1,060	980	704	314	2,800	171
3..........	117	123	117	5,700	14,500	1,130	760	980	718	279	1,280	167
4..........	117	123	137	3,690	9,180	1,200	1,060	980	1,130	279	1,580	205
5..........	111	123	413	2,480	6,570	1,360	1,360	830	830	266	3,040	293
6..........	111	123	2,090	2,000	4,540	1,500	2,480	760	648	238	2,280	537
7..........	117	120	2,000	1,660	3,040	14,800	4,250	760	550	205	1,740	830
8..........	151	117	3,690	1,820	2,480	10,600	3,420	788	474	232	1,060	816
9..........	171	117	3,690	1,820	2,180	5,410	2,690	830	321	266	980	1,280
10..........	232	117	3,690	1,740	2,000	3,690	2,090	816	307	328	2,690	905
11..........	314	117	3,290	1,500	1,910	3,420	1,660	905	344	273	5,990	690
12..........	260	120	2,180	1,360	1,820	3,970	1,500	980	524	221	5,120	511
13..........	210	117	1,580	1,360	2,090	3,970	3,420	1,360	1,360	200	11,500	461
14..........	200	111	1,360	1,200	7,730	5,410	8,310	1,280	4,250	176	4,540	537
15..........	180	123	1,580	1,360	5,990	3,690	10,900	1,200	3,160	162	2,280	511
16..........	167	137	6,280	1,740	3,420	2,920	8,310	1,280	2,280	154	1,660	425
17..........	167	126	7,440	2,800	2,920	10,600	5,410	1,500	1,740	151	1,200	249
18..........	158	117	12,100	2,090	2,380	8,020	3,690	1,740	1,200	147	980	190
19..........	154	137	6,570	1,580	1,820	5,700	2,690	1,580	905	144	830	190
20..........	151	151	3,420	1,740	1,360	4,830	2,090	1,430	830	140	732	243
21..........	144	151	2,280	2,000	1,360	3,690	1,740	1,280	980	126	620	227
22..........	144	176	1,910	2,690	1,280	2,920	1,580	1,200	816	114	425	260
23..........	144	151	1,580	3,420	1,200	2,920	1,280	1,130	704	111	353	353
24..........	140	151	1,360	3,160	830	6,860	1,200	2,380	1,060	114	336	524
25..........	144	158	1,130	2,580	718	6,570	1,130	2,800	550	117	293	662
26..........	130	144	980	2,180	648	4,540	980	1,910	321	130	266	564
27..........	137	137	788	2,280	1,060	3,690	905	1,740	321	195	266	486
28..........	144	130	802	9,470	830	2,580	1,060	1,500	307	634	273	402
29..........	137	123	1,060	14,800	....	1,910	1,580	1,130	321	402	238	344
30..........	130	114	1,280	8,020	....	1,660	1,200	980	344	328	200	293
31..........	126	....	1,060	4,830	....	1,500	....	905	....	802	190	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1924.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	[illegible]	[illegible]	[illegible]	6,570	1,820	3,690	6,860	1,360	[illegible]	[illegible]	[illegible]	662
2	232	151	2,690	6,570	[illegible]	3,420	4,830	1,910	3,160	[illegible]	[illegible]	537
3	200	144	2,000	6,570	1,580	3,160	3,160	1,580	2,480	[illegible]	[illegible]	486
4	185	391	1,660	15,100	1,500	2,690	2,280	1,430	1,910	413	402	437
5	[illegible]	802	2,920	8,020	1,430	5,120	3,160	1,280	2,090	371	371	[illegible]
6	162	662	6,570	5,120	1,500	8,890	3,970	1,200	2,090	344	[illegible]	[illegible]
7	151	[illegible]	5,410	3,040	2,480	8,310	5,410	1,130	1,360	578	254	362
8	[illegible]	[illegible]	3,690	2,090	2,480	5,700	5,700	1,130	1,130	980	232	321
9	140	620	2,920	1,580	1,910	3,690	4,830	1,280	1,200	[illegible]	216	336
10	137	511	2,580	1,430	1,740	3,160	3,970	1,360	5,120	2,480	205	[illegible]
11	140	[illegible]	2,090	1,430	1,500	2,690	3,420	3,420	7,150	1,430	200	300
12	144	371	1,910	8,310	1,360	2,180	2,800	25,000	[illegible]	1,130	[illegible]	425
13	151	321	1,740	5,990	1,280	1,820	2,480	20,700	2,920	905	905	[illegible]
14	140	[illegible]	1,660	4,250	1,130	1,580	2,090	12,100	7,150	3,420	905	[illegible]
15	133	266	1,500	2,690	980	1,430	1,740	9,180	4,830	2,180	[illegible]	293
16	123	254	1,360	3,040	905	1,430	1,580	7,440	3,970	1,580	486	266
17	117	314	1,130	21,300	830	1,500	1,430	5,120	3,160	1,360	[illegible]	328
18	126	321	1,060	9,760	1,060	1,910	1,740	3,690	2,380	1,130	279	273
19	140	293	1,060	5,120	1,500	2,580	3,970	2,920	1,820	905	221	243
20	154	[illegible]	980	3,970	2,090	3,160	[illegible]	2,580	1,500	[illegible]	1,360	221
21	162	243	[illegible]	3,690	6,860	3,160	3,420	2,690	1,280	564	3,970	210
22	180	[illegible]	1,060	3,160	5,120	3,160	2,920	2,920	1,060	511	3,160	216
23	195	[illegible]	1,360	2,280	[illegible]	2,920	2,480	2,690	830	499	1,580	1,200
24	195	437	2,000	1,580	2,480	2,480	2,090	2,480	704	620	1,280	1,060
25	200	[illegible]	2,380	1,740	2,000	2,920	1,660	1,910	802	690	7,440	905
26	205	1,280	2,280	2,280	1,910	3,290	1,580	1,660	704	[illegible]	5,410	676
27	190	1,280	2,090	2,090	2,090	4,540	1,360	2,280	620	362	3,420	511
28	[illegible]	[illegible]	2,090	1,660	2,690	5,120	1,200	2,800	[illegible]	[illegible]	[illegible]	[illegible]
29	195	718	9,470	1,430	5,700	14,200	1,200	2,800	[illegible]	266	[illegible]	592
30	[illegible]	[illegible]	5,410	1,360	....	19,800	1,200	10,300	[illegible]	243	1,280	12,400
31	171	....	[illegible]	1,660	....	[illegible]	....	[illegible]	....	227	[illegible]	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1925.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13,000	271	662	[illegible]		1,280	2,800	5,120	415	[illegible]	118	80
2	6,570	[illegible]	620	1,500	2,200	1,200	2,380	4,250	[illegible]	437	115	75
3	3,040	218	[illegible]	[illegible]		1,200	2,090	3,420	[illegible]	395	115	77
4	2,090	212	511	[illegible]	2,180	1,200	2,000	2,920	336	356	131	77
5	1,580	212	[illegible]	1,910	2,280	1,130	1,910	2,480	303	318	162	75
6	1,280	206	366	[illegible]	1,800	1,130	1,910	2,280	[illegible]	287	184	75
7	1,130	200	405	1,910	3,290	1,060	1,740	2,090	1,060	264	194	75
8	1,060	188	5,120	1,740	3,970	1,060	1,500	2,090	905	287	184	75
9	980	760	13,300	[illegible]	4,540	1,060	1,280	2,280	802	648	[illegible]	72
10	802	486	7,440	[illegible]	6,860	980	1,130	2,480	690	592	170	71
11	676	437	4,250	[illegible]	8,600	980	1,200	2,690	578	[illegible]	162	71
12	[illegible]	395	3,160	[illegible]	9,760	980	1,130	3,690	[illegible]	[illegible]	162	71
13	511	356	2,580	[illegible]	8,310	[illegible]	980	6,570	461	511	153	71
14	486	318	2,180	[illegible]	5,700	905	905	4,250	415	486	153	77
15	437	287	1,820	[illegible]	3,970	830	774	[illegible]	376	[illegible]	148	87
16	395	830	1,580	1,910	6,860	774	704	3,160	461	395	144	95
17	[illegible]	718	1,430	[illegible]	7,440	690	[illegible]	2,480	[illegible]	[illegible]	144	95
18	279	511	[illegible]	[illegible]	5,990	[illegible]	788	2,090	905	318	141	95
19	236	[illegible]	[illegible]	[illegible]	[illegible]	4,540	732	1,740	950	287	[illegible]	[illegible]
20	[illegible]	592	1,280	[illegible]	3,420	13,900	578	1,430	830	256	137	95
21	279	[illegible]	1,500	[illegible]	2,480	[illegible]	[illegible]	1,280	746	[illegible]	[illegible]	95
22	303	550	[illegible]	[illegible]	[illegible]	3,160	[illegible]	[illegible]	537	206	131	95
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,910	980	[illegible]	425	[illegible]	131	[illegible]
24	[illegible]	3,970	[illegible]	[illegible]	1,580	[illegible]	[illegible]	[illegible]	[illegible]	179	128	95
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,200	788	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,360	[illegible]	115	[illegible]
27	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	1,580	[illegible]	[illegible]	157	[illegible]	[illegible]
28	[illegible]	[illegible]	1,200		1,280	[illegible]	[illegible]	[illegible]	1,060	[illegible]	[illegible]	101
29	[illegible]	[illegible]	[illegible]	[illegible]	....	1,740	3,970	[illegible]	[illegible]	[illegible]	92	101
30	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	511	606	137	[illegible]	106
31	[illegible]	....	[illegible]			2,800	....	[illegible]	....	[illegible]	[illegible]	....

NOTE.—Mean discharge estimated, because of [illegible], from climatic data [illegible] 27-31 and [illegible]

Daily discharge, in second-feet, of Greenbrier River at Alderson, W. Va., for the year ending Sept. 30, 1926.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1..........	101	2,480	718		5,120	3,420	1,740	1,200	2,090	200	153	816
2..........	101	2,280	676		5,990	2,690	1,580	1,060	2,090	179	1,200	704
3..........	104	2,090	620	530	4,250	2,480	1,580	980	1,910	166	980	578
4..........	106	1,910	564		3,690	2,090	1,910	980	1,740	148	606	690
5..........	112	1,740	634		2,800	1,740	1,910	905	1,580	134	385	499
6..........	118	1,740	676		2,280	1,580	1,910	816	1,430	2,380	295	356
7..........	125	1,910	620		2,090	1,580	1,740	732	1,360	2,280	256	437
8..........	134	3,040	578		2,000	2,280	1,660	676	1,200	1,360	206	578
9..........	144	3,690	550		1,820	3,290	1,580	634	1,060	980	230	564
10..........	157	3,160	524		1,820	2,380	1,430	620	980	537	248	524
11..........	179	2,920	499	730	1,660	2,090	1,660	592	980	648	194	449
12..........	206	2,690	474		1,580	2,090	2,090	606	905	437	153	395
13..........	248	2,480	449		2,280	1,910	3,160	578	905	336	131	336
14..........	310	2,280	437		10,300	1,910	3,970	550	788	287	112	279
15..........	395	2,090	437		16,700	1,910	3,690	564	676	256	128	248
16..........	537	1,910	425		8,600	1,820	3,160	524	578	224	200	242
17..........	606	1,740	415	802	4,830	1,740	2,800	511	437	184	310	224
18..........	676	1,580	415	2,580	3,420	1,660	2,280	511	356	166	499	206
19..........	760	1,430	415	5,120	3,420	1,660	2,690	499	318	144	905	200
20..........	816	1,360	405	19,800	4,540	3,970	2,280	461	326	141	4,830	188
21..........	905	1,200	620	11,500	3,970	5,700	1,910	437	326	131	5,700	184
22..........	980	1,130	1,360	16,000	3,160	4,830	1,740	415	310	115	3,160	170
23..........	1,060	1,060	5,120	12,700	2,920	4,250	4,250	395	295	109	2,090	157
24..........	1,130	980	4,540	5,700	2,800	5,700	3,690	376	295	128	2,000	144
25..........	1,360	905	2,280	3,690	2,800	5,120	2,920	578	279	218	1,910	128
26..........	5,410	830	1,280	2,480	8,600	5,700	2,090	564	486	310	12,100	212
27..........	5,120	830	980	2,090	6,570	7,730	1,740	486	449	346	6,280	366
28..........	4,250	802		1,910	4,250	8,600	1,500	802	366	295	3,420	346
29..........	3,690	774		1,580	....	4,250	1,430	676	303	212	1,740	310
30..........	3,160	746	540	1,060	....	2,380	1,360	634	248	153	1,360	408
31..........	2,690	....		1,580	....	1,910	....	676	....	125	1,060	....

NOTE.—Stage-discharge relation affected by ice Dec. 28 to Jan. 16; discharge estimated from observer's notes and study of weather records.

Daily discharge, in second-feet, of Greenbrier River at Alderson, 1926-27.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1..........	336	1,580	1,740	3,290	5,120	2,920	3,970	10,000	905	318	212	366
2..........	295	1,500	2,280	2,690	3,970	2,480	12,400	7,440	816	356	212	336
3..........	1,740	1,430	2,180	2,280	2,920	2,280	6,570	4,540	1,580	310	376	303
4..........	1,660	1,280	2,090	2,090	2,480	1,820	5,120	3,420	2,380	287	1,500	256
5..........	2,000	1,200	1,910	1,910	2,800	1,660	8,020	2,800	2,480	248	1,910	256
6..........	1,660	1,130	1,910	1,740	18,800	1,580	6,570	2,280	2,280	236	1,200	242
7..........	1,430	1,060	2,690	1,500	11,200	1,660	5,700	2,090	1,910	218	802	206
8..........	1,200	980	2,280	1,360	7,440	2,800	4,250	1,820	1,660	248	732	184
9..........	905	905	2,280	1,200	5,120	7,440	10,000	1,580	1,430	287	1,500	170
10..........	718	830	3,970		3,690	5,120	15,100	1,500	1,280	524	2,090	310
11..........	578	816	5,120		3,290	3,420	9,760	1,430	1,130	634	2,090	1,280
12..........	499	905	4,250		2,800	2,690	6,280	1,360	980	537	1,500	366
13..........	905	1,500	8,020		2,480	2,480	4,540	1,360	905	578	1,130	376
14..........	980	1,580	9,180	850	3,420	2,090	4,540	1,280	1,200	461	788	511
15..........	802	1,430	5,700		3,690	2,690	5,120	1,280	2,920	376	606	376
16..........	718	10,000	3,970		3,290	3,040	3,970	1,360	2,800	405	1,280	326
17..........	774	15,100	2,690		3,160	2,580	3,690	1,660	1,910	366	1,200	318
18..........	905	10,900	2,380	1,360	3,040	2,280	3,290	2,580	1,500	461	905	271
19..........	980	8,310	1,910	1,430	17,600	2,090	3,290	3,420	1,280	437	746	218
20..........	1,130	5,700	1,580	1,430	17,600	1,740	3,420	2,920	1,360	346	1,060	188
21..........	1,360	4,540	3,040	2,920	9,180	1,660	5,700	2,280	1,280	271	980	179
22..........	1,500	3,970	22,900	8,020	6,280	1,580	6,860	1,910	1,060	242	1,430	166
23..........	1,820	3,160	12,700	7,150	15,400	1,580	7,440	1,910	905	326	1,360	153
24..........	1,910	2,180	7,730	6,280	15,100	1,500	5,120	2,090	905	318	1,200	144
25..........	1,820	1,580	7,730	5,410	9,180	1,500	3,690	1,740	830	264	908	137
26..........	1,820	1,430	30,400	3,970	6,860	1,360	2,690	1,580	732	461	774	131
27..........	1,740	1,500	15,100	2,800	5,120	1,280	2,280	1,360	578	303	648	125
28..........	1,660	1,430	8,310	2,090	3,420	1,130	2,090	1,200	449	242	499	125
29..........	1,580	1,360	8,020	2,280	....	1,060	2,090	1,200	395	206	415	125
30..........	1,500	1,740	5,990	2,690	....	980	2,920	1,060	356	188	385	118
31..........	1,500	....	3,970	6,570	....	980	....	1,060	....	206	376	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, 1927-28.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	[illegible]	[illegible]	[illegible]	[illegible]	1,360	1,500	3,160	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	112	[illegible]	760	3,970	1,200	1,360	2,580	11,000	980	2,920	264	1,360
3	106	[illegible]	[illegible]	[illegible]	1,060	1,200	2,280	6,570	816	2,690	242	1,200
4	157	592	2,920	[illegible]	1,060	1,060	2,000	4,250	802	2,090	366	1,280
5	[illegible]	2,480	3,420	3,690	1,130	980	1,820	2,800	830	1,580	474	1,060
6	184	1,660	3,970	1,910	1,280	905	1,660	2,180	1,660	1,280	395	[illegible]
7	179	592	3,290	1,580	1,660	830	1,580	2,090	3,160	980	366	905
8	212	1,280	[illegible]	1,500	1,910	774	1,500	1,820	2,180	830	425	905
9	[illegible]	2,580	5,120	1,430	4,250	760	1,660	1,580	[illegible]	746	400	788
10	170	2,690	3,290	1,280	3,970	1,060	1,580	1,430	1,580	2,690	376	676
11	[illegible]	2,690	2,800	1,200	3,040	1,360	1,580	1,280	1,820	2,090	1,910	[illegible]
12	218	2,380	2,480	1,060	2,480	1,360	3,420	1,130	1,820	2,000	1,360	405
13	1,820	2,000	2,380	905	2,000	1,280	3,690	980	1,660	2,920	[illegible]	366
14	2,920	1,580	6,280	905	1,910	1,280	3,160	905	1,580	9,370	[illegible]	326
15	1,360	1,360	5,120	[illegible]	7,440	1,580	2,800	830	1,500	6,000	499	303
16	980	1,130	5,120	1,130	6,570	1,660	2,280	760	1,280	2,380	1,500	287
17	760	1,740	6,860	1,130	3,970	2,280	1,910	732	1,130	1,580	8,760	287
18	550	8,330	5,120	1,130	3,040	3,970	1,740	980	1,130	1,280	5,410	271
19	[illegible]	6,720	3,290	4,540	2,580	3,040	1,580	905	[illegible]	1,060	3,690	376
20	486	3,420	2,280	4,100	2,090	2,480	1,430	905	5,700	816	2,480	3,970
21	1,500	2,380	2,090	11,900	1,820	2,580	1,280	905	9,800	648	1,660	3,690
22	2,000	1,820	1,740	7,730	1,500	3,420	1,200	788	4,540	564	980	2,180
23	1,500	1,500	1,500	3,970	[illegible]	11,600	1,200	830	3,160	499	830	1,580
24	1,130	1,360	1,200	2,280	2,090	10,100	1,500	1,060	3,290	425	788	1,130
25	980	1,200	1,060	3,420	2,380	7,440	1,660	1,130	3,690	366	690	802
26	[illegible]	1,060	802	[illegible]	2,090	5,700	2,580	1,360	3,420	318	634	[illegible]
27	606	980	732	3,040	[illegible]	[illegible]	2,580	1,910	2,480	295	1,280	511
28	511	905	537	2,280	1,740	3,290	[illegible]	1,740	1,820	326	3,040	449
29	437	[illegible]	830	1,740	1,660	2,580	5,000	1,580	1,500	310	2,090	415
30	366	774	1,660	1,500	....	3,160	12,700	1,360	3,040	303	1,430	449
31	[illegible]	....	2,690	1,360	....	3,690	....	1,200	....	287	1,280	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, 1928-29.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	[illegible]	[illegible]	[illegible]	[illegible]	1,660	20,700	2,380	3,970	5,410	500	157	105
2	[illegible]	[illegible]	[illegible]	[illegible]	1,660	11,000	2,180	3,970	3,420	[illegible]	141	99
3	[illegible]	[illegible]	[illegible]	[illegible]	1,200	7,730	2,000	11,900	2,690	2,380	134	94
4	[illegible]	[illegible]	[illegible]	[illegible]	1,280	5,700	1,740	8,600	1,820	1,430	138	90
5	[illegible]	[illegible]	[illegible]	[illegible]	1,060	10,100	3,040	6,280	1,200	905	218	87
6	[illegible]	[illegible]	[illegible]	[illegible]	980	20,400	3,160	4,540	1,430	704	287	84
7	[illegible]	[illegible]	[illegible]	[illegible]	905	10,400	2,480	3,420	1,200	578	200	84
8	[illegible]	[illegible]	[illegible]	[illegible]	1,130	7,150	2,180	2,580	1,130	525	206	85
9	[illegible]	[illegible]	[illegible]	[illegible]	1,430	4,830	1,820	2,180	1,130	385	162	90
10	[illegible]	[illegible]	[illegible]	[illegible]	1,660	3,290	1,660	1,820	1,200	326	144	110
11	[illegible]	[illegible]	[illegible]	[illegible]	1,580	2,580	1,580	1,660	1,200	279	138	101
12	[illegible]	[illegible]	[illegible]	[illegible]	1,430	2,280	1,430	2,430	[illegible]	248	131	115
13	[illegible]	[illegible]	[illegible]	[illegible]	1,280	2,090	1,280	1,360	[illegible]	538	125	101
14	[illegible]	[illegible]	[illegible]	[illegible]	1,200	3,690	1,130	1,430	1,060	462	131	99
15	[illegible]	[illegible]	[illegible]	[illegible]	1,130	11,900	1,060	3,690	1,130	475	125	99
16	[illegible]	[illegible]	[illegible]	[illegible]	1,130	7,150	1,430	2,800	1,200	405	122	99
17	[illegible]	[illegible]	[illegible]	[illegible]	1,060	4,830	5,120	2,280	980	336	128	94
18	[illegible]	[illegible]	[illegible]	[illegible]	980	3,420	4,250	1,820	816	279	118	97
19	[illegible]	[illegible]	[illegible]	[illegible]	1,060	2,690	3,420	1,740	662	236	112	94
20	[illegible]	[illegible]	[illegible]	[illegible]	1,500	[illegible]	2,920	1,820	830	212	105	101
21	[illegible]	[illegible]	[illegible]	[illegible]	1,820	[illegible]	3,040	17,300	980	179	97	94
22	[illegible]	[illegible]	[illegible]	[illegible]	1,430	2,000	3,420	9,200	816	162	92	94
23	[illegible]	[illegible]	[illegible]	[illegible]	1,360	4,250	3,970	5,410	500	148	112	94
24	[illegible]	[illegible]	[illegible]	[illegible]	1,200	8,020	3,160	3,160	512	[illegible]	395	99
25	[illegible]	[illegible]	[illegible]	[illegible]	1,360	5,410	2,580	2,580	1,130	128	704	94
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,480	2,000	[illegible]	134	376	92
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,580	1,910	1,060	138	256	87
28	[illegible]	[illegible]	[illegible]	[illegible]	29,100	2,480	3,040	1,740	830	144	188	84
29	[illegible]	[illegible]	[illegible]	[illegible]	....	[illegible]	6,280	5,990	[illegible]	[illegible]	157	80
30	[illegible]	[illegible]	[illegible]	[illegible]	....	2,000	5,700	8,310	[illegible]	170	134	82
31	[illegible]	....	[illegible]	[illegible]	....	[illegible]	....	[illegible]	....	144	115	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, 1929-30.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,090	2,460	1,520	3,200	620	2,080	889	570	237	123	38	38
2	7,150	2,220	1,350	2,970	742	1,860	850	600	225	123	35	38
3	12,200	6,470	1,180	3,020	915	1,670	863	620	202	110	38	35
4	5,410	12,200	1,020	2,970	3,720	1,460	1,120	631	188	97	35	35
5	2,690	7,150	954	2,460	8,700	1,210	1,460	570	173	84	31	35
6	1,740	4,080	1,080	2,050	8,100	1,160	1,740	550	173	78	30	31
7	1,280	2,780	1,260	1,860	5,100	1,380	5,400	570	192	73	30	31
8	980	2,110	1,700	1,760	3,640	8,100	6,450	631	188	70	33	33
9	760	1,690	2,360	1,630	2,870	7,650	5,400	766	188	64	38	35
10	550	1,440	2,570	1,560	2,380	4,500	4,080	664	207	58	31	35
11	462	1,250	2,340	1,440	2,050	3,250	3,230	590	448	56	28	31
12	415	1,180	2,120	1,270	1,720	2,940	2,660	560	1,790	53	30	30
13	310	1,160	2,220	1,180	1,510	2,770	2,220	520	1,050	51	33	33
14	279	1,160	2,530	1,160	1,580	2,660	1,860	502	708	61	35	33
15	271	1,400	2,510	1,230	1,600	2,750	1,650	493	530	73	43	33
16	236	1,640	2,260	1,240	1,480	2,510	1,510	493	430	61	48	40
17	224	2,110	1,970	1,130	1,210	2,300	1,290	550	345	53	48	40
18	206	26,600	1,810	1,020	1,160	2,080	1,130	540	296	53	43	38
19	200	21,300	3,520	850	1,290	2,220	1,110	610	262	58	53	35
20	188	8,700	6,600	814	1,210	3,330	1,040	928	231	58	48	33
21	194	5,100	4,350	742	1,160	3,100	954	915	212	70	61	35
22	1,980	3,280	2,820	941	1,180	2,530	928	708	197	73	61	35
23	5,840	2,460	2,420	1,100	1,310	2,080	980	590	178	61	58	35
24	4,830	2,050	2,120	850	1,680	1,770	915	502	151	64	61	33
25	2,560	1,770	1,670	766	2,610	1,560	838	430	139	56	61	35
26	1,810	1,530	1,480	742	3,120	1,490	778	379	127	48	58	43
27	1,380	1,440	1,320	826	2,970	1,410	730	331	123	48	56	40
28	1,120	1,560	1,950	876	2,460	1,190	675	310	116	51	53	35
29	965	1,720	5,700	876	....	1,050	631	289	116	56	48	30
30	980	1,680	5,250	730	....	967	600	269	120	51	45	30
31	1,600	....	3,810	664	....	941	....	250	....	43	43	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, 1930-31.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	28	48	53	275	876	610	4,350	1,720	1,430	354	289	778
2	28	43	67	317	730	1,020	6,300	1,410	1,360	303	244	610
3	30	40	67	244	580	2,220	5,250	1,240	1,150	269	2,710	511
4	30	43	103	231	511	1,940	5,400	1,110	928	310	3,900	439
5	31	51	87	244	448	1,560	13,800	995	814	388	2,380	422
6	31	58	120	1,160	370	1,230	8,700	850	754	502	2,080	396
7	31	58	163	2,870	331	995	6,600	838	1,020	540	1,340	331
8	31	56	466	1,680	310	902	5,550	4,050	1,490	475	850	269
9	31	51	493	1,060	354	1,260	5,400	5,100	1,540	457	590	225
10	31	51	493	754	1,460	1,390	6,300	3,410	1,390	413	475	197
11	33	53	354	600	3,280	1,160	5,550	2,460	1,130	370	430	207
12	35	56	269	590	1,970	941	5,400	2,180	915	766	370	168
13	33	70	225	511	1,460	838	4,200	2,340	778	889	345	151
14	31	70	197	396	1,210	876	3,150	2,280	814	631	388	147
15	30	73	173	282	1,540	2,140	2,530	2,340	838	511	338	151
16	30	76	151	275	1,540	6,000	2,080	2,180	1,860	826	303	183
17	31	93	120	202	1,360	4,500	1,760	1,990	4,140	502	262	202
18	30	97	76	282	2,380	2,770	1,480	1,770	2,240	430	218	188
19	31	100	93	317	3,990	2,120	1,270	5,880	1,480	331	188	168
20	30	97	100	310	3,150	1,880	1,110	3,250	1,060	310	173	151
21	31	93	87	310	2,340	1,760	954	5,700	814	282	173	275
22	33	90	73	303	1,790	1,540	928	9,000	653	362	317	362
23	35	87	84	303	1,380	1,490	2,730	12,900	778	310	4,340	282
24	51	84	76	324	1,120	2,280	3,730	10,200	742	580	4,650	331
25	58	78	76	448	954	3,070	3,230	6,600	686	928	2,420	396
26	53	76	76	448	826	3,700	2,730	5,100	697	902	1,540	396
27	51	70	110	493	719	3,730	2,680	3,640	610	590	1,080	1,150
28	48	56	135	1,210	642	3,580	2,900	2,680	530	430	863	1,360
29	51	48	197	2,260	....	9,300	2,550	2,100	457	354	802	1,060
30	56	43	237	1,580	....	9,300	2,120	1,720	413	324	754	742
31	51	....	275	1,020	....	5,400	....	1,440	....	282	928	....

Daily discharge, in second-feet, of Greenbrier River at Alderson, 1931-32.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July	Aug.	Sept.
1	[illegible]	[illegible]	[illegible]	1,670	[illegible]	1,180	[illegible]	[illegible]	430	[illegible]	[illegible]	76
[illegible]	457	143	475	[illegible]	[illegible]	1,080	9,600	[illegible]	[illegible]	1,600	231	76
[illegible]	[illegible]	159	675	[illegible]	[illegible]	[illegible]	6,450	8,550	362	1,130	269	116
4	[illegible]	[illegible]	502	[illegible]	[illegible]	1,150	4,350	5,100	331	[illegible]	282	120
[illegible]	[illegible]	151	404	[illegible]	[illegible]	[illegible]	3,100	3,500	310	12,700	310	116
[illegible]	250	143	345	[illegible]	[illegible]	3,870	2,530	2,640	296	14,800	259	188
[illegible]	225	135	324	[illegible]	[illegible]	6,000	2,300	2,100	[illegible]	11,600	256	147
8	207	135	310	[illegible]	[illegible]	4,500	[illegible]	1,740	303	6,000	207	147
9	192	131	303	8,700	3,550	3,280	2,030	1,480	282	3,810	173	123
10	183	123	354	7,350	2,820	2,530	3,780	1,490	269	2,380	147	106
11	173	120	1,860	4,950	2,380	1,880	3,700	2,360	244	1,790	135	90
12	[illegible]	120	2,730	3,200	2,420	1,720	3,120	5,800	256	1,380	163	106
13	159	120	4,020	[illegible]	[illegible]	[illegible]	2,700	[illegible]	331	1,050	159	113
14	143	120	3,390	2,050	2,820	1,440	2,260	6,900	1,000	802	[illegible]	87
15	139	[illegible]	3,840	1,760	2,320	1,210	1,900	[illegible]	1,080	[illegible]	178	70
16	135	116	3,440	1,540	2,050	1,040	1,610	3,470	730	600	168	61
17	135	116	2,220	1,380	2,220	2,930	1,440	2,570	653	580	159	58
18	135	116	1,610	1,240	3,330	16,000	1,270	2,070	550	493	155	56
[illegible]	131	123	1,210	1,110	3,390	9,900	1,160	1,700	570	[illegible]	163	48
20	131	127	980	980	2,700	6,450	1,060	1,410	[illegible]	370	244	[illegible]
21	131	[illegible]	838	876	2,220	5,100	954	1,210	778	317	192	45
[illegible]	135	123	954	[illegible]	2,180	6,750	876	1,240	1,610	289	178	48
23	139	116	2,480	754	2,400	9,900	850	1,320	876	262	202	48
24	[illegible]	116	2,820	754	2,100	7,050	790	1,130	642	256	188	51
25	123	116	2,590	814	1,770	4,650	802	915	475	256	173	48
26	120	110	2,220	1,040	1,540	3,280	2,030	790	370	[illegible]	127	[illegible]
27	120	110	1,770	[illegible]	[illegible]	[illegible]	2,750	697	331	250	116	127
28	116	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,260	708	6,690	[illegible]	103	116
29	123	116	[illegible]	[illegible]	[illegible]	[illegible]	1,900	610	13,400	192	[illegible]	100
30	135	143	[illegible]	[illegible]	......	[illegible]	1,650	[illegible]	5,250	183	87	93
31	135	......	1,080	[illegible]	......	[illegible]	......	[illegible]	......	[illegible]	78	......

Daily discharge, in second-feet, of Greenbrier River at Alderson, 1932-33.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,510	3,280	2,340	1,110	[illegible]	[illegible]	[illegible]	540
[illegible]	[illegible]	1,270	[illegible]	[illegible]	2,730	2,660	2,770	1,020	1,160	413	1,600	457
[illegible]	93	1,440	[illegible]	[illegible]	[illegible]	2,200	3,610	1,020	941	413	2,050	422
[illegible]	[illegible]	1,100	[illegible]	[illegible]	3,670	1,880	4,650	995	802	413	3,410	430
5	[illegible]	814	[illegible]	[illegible]	3,150	1,600	4,350	1,110	[illegible]	[illegible]	4,950	642
6	106	653	520	1,720	[illegible]	1,360	3,730	1,920	620	540	2,820	778
[illegible]	120	600	[illegible]	[illegible]	[illegible]	1,260	6,300	4,950	620	370	1,740	620
[illegible]	147	642	[illegible]	[illegible]	[illegible]	1,490	7,650	4,140	530	[illegible]	1,210	[illegible]
[illegible]	[illegible]	1,420	[illegible]	[illegible]	[illegible]	2,440	5,700	3,230	708	250	915	396
[illegible]	310	9,520	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	675	225	754	324
11	225	6,900	[illegible]	[illegible]	[illegible]	2,220	[illegible]	[illegible]	675	296	719	289
[illegible]	173	3,610	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,120	338	1,360	250
[illegible]	143	2,260	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	863	354	1,990	231
14	[illegible]	1,600	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	826	396	1,320	212
15	113	1,210	[illegible]	[illegible]	2,770	[illegible]	[illegible]	[illegible]	766	296	[illegible]	212
16	120	967	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	580	310	742	197
17	244	856	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	475	296	697	197
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	404	262	686	183
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	354	324	600	202
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	317	303	466	202
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	289	250	388	188
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	262	231	430	163
[illegible]	475	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	225	197	331	155
[illegible]	388	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	207	202	296	151
[illegible]	324	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	225	262	282	151
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	448	262	1,700	159
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	580	2,440	1,240	139
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	766	11,100	[illegible]	[illegible]
[illegible]	1,020	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	742	12,300	[illegible]	123
[illegible]	814	[illegible]	[illegible]	[illegible]	......	[illegible]	[illegible]	[illegible]	697	6,000	[illegible]	123
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	......	3,170	[illegible]	......

Daily discharge, in second-feet, of Greenbrier River at Alderson, 1933-34.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	125	117	284	626	370	520	3,400	749	348	141	177	76
2	121	113	303	2,540	392	520	2,750	681	329	168	224	72
3	117	109	316	3,450	502	7,930	2,260	637	290	192	303	69
4	113	113	342	2,600	484	25,700	1,940	615	268	154	457	63
5	117	113	378	1,990	511	32,200	1,770	596	240	168	408	79
6	109	125	457	1,860	493	22,500	1,650	577	234	159	284	85
7	102	141	586	2,950	415	11,500	1,540	548	240	136	310	76
8	98	187	692	8,960	400	14,400	1,460	520	290	117	234	63
9	95	182	725	5,780	415	16,000	1,430	475	329	145	213	61
10	92	187	586	3,640	316	8,140	1,630	448	348	234	177	56
11	92	203	539	2,500	251	5,250	1,560	439	303	475	145	53
12	88	182	484	1,900	290	3,570	1,630	520	268	251	141	48
13	92	164	362	1,740	329	2,680	1,680	833	342	187	136	50
14	92	159	370	1,390	303	2,340	1,740	761	303	154	121	48
15	92	154	342	1,260	310	2,100	1,630	670	290	136	125	48
16	88	154	422	1,060	362	1,920	1,680	1,160	268	117	132	240
17	98	145	539	899	385	1,770	3,460	2,160	229	98	208	2,550
18	113	128	1,430	737	475	1,650	9,270	1,720	218	88	213	2,080
19	159	168	1,680	615	548	1,740	6,460	1,360	234	82	310	980
20	168	240	2,990	626	502	2,790	4,730	1,080	362	72	362	568
21	177	329	5,780	626	439	3,960	3,610	886	502	61	251	392
22	203	400	3,660	558	457	3,710	2,810	737	430	61	203	296
23	177	362	2,360	548	439	3,190	2,280	659	322	61	159	245
24	154	362	1,720	548	378	2,810	1,920	615	256	61	145	208
25	136	520	1,310	548	422	2,730	1,630	539	234	66	136	182
26	121	457	1,070	548	378	3,100	1,360	475	224	56	164	173
27	113	385	886	530	457	5,490	1,190	457	234	53	145	198
28	109	322	615	558	457	24,600	1,080	457	192	993	121	154
29	109	284	475	548	....	13,100	980	400	159	670	106	154
30	109	268	392	400	....	6,600	858	378	141	362	88	694
31	113	....	568	310	....	4,470	....	362	....	245	82	....

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917.
[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1895.					
August	390	125	252	0.188	0.22
September	755	82	164	.122	.14
1895-96.					
October	101	70	82.8	.062	.07
November	258	101	151	.113	.13
December	3,150	157	474	.354	.41
January	4,620	280	1,020	.761	.88
February	10,600	700	2,990	2.23	2.40
March	25,600	810	4,620	3.45	3.98
April	12,900	870	2,740	2.04	2.28
May	5,690	555	1,510	1.13	1.30
June	3,610	390	894	.667	.74
July	12,900	573	2,360	1.76	2.03
August	5,420	250	1,060	.791	.91
September	6,520	182	445	.332	.37
The year	25,600	70	1,530	1.14	15.51
1896-97.					
October	11,600	280	1,040	0.776	0.89
November	21,800	262	2,800	2.09	2.33
December	6,240	125	1,400	1.04	1.20
January	1,040	470	870	.649	.75
February	51,500	528	7,690	5.74	5.98
March	12,300	1,460	4,100	3.10	3.57
April	6,240	700	2,170	1.62	1.81
May	32,300	680	4,010	2.99	3.45
June	1,900	510	1,020	.761	.85
July	6,240	510	2,080	1.55	1.79
August	1,000	244	473	.353	.41
September	232	110	147	.110	.12
The year	51,500	110	2,290	1.71	23.15
1897-98.					
October	187	113	146	.109	.13
November	573	125	251	.187	.21
December	4,880	390	1,240	.925	1.07
January	15,700	620	3,590	2.68	3.09
February	5,090	755	2,000	1.49	1.55
March	16,400	1,070	3,690	2.75	3.17
April	13,300	1,550	3,970	2.96	3.30
May	16,400	1,070	3,520	2.63	3.03
June	1,300	430	761	.568	.63
July	2,950	238	705	.526	.61
August	42,900	430	4,390	3.28	3.78
September	510	209	300	.224	.25
The year	42,900	113	2,060	1.54	20.82
1898-99.					
October	23,000	204	1,920	1.43	1.65
November	10,300	810	2,420	1.81	2.02
December	8,810	630	2,210	1.65	1.90
January	18,600	1,380	3,320	2.48	2.86
February	18,000	755	4,750	3.54	3.69
March	45,300	2,190	8,420	6.28	7.24
April	6,240	870	2,060	1.54	1.72
May	14,000	650	2,950	2.20	2.54
June	2,500	390	1,030	.769	.86
July	336	165	219	.163	.19
August	810	75	157	.117	.13
September	280	95	155	.116	.13
The year	45,300	75	2,460	1.84	24.93

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.
[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1899-1900.					
October	157	75	105	.078	.09
November	268	113	156	.116	.13
December	1,000	125	345	.257	.30
January	9,700	....	1,690	1.26	1.45
February	16,000	390	3,390	2.53	2.64
March	17,100	1,220	5,010	3.74	4.31
April	3,850	700	1,850	1.38	1.54
May	1,720	301	661	.493	.57
June	7,360	268	1,140	.851	.95
July	4,100	133	813	.607	.70
August	1,000	110	226	.169	.19
September	414	70	145	.108	.12
The year	17,100	70	1,280	.955	12.99
1900-1.					
October	3,380	104	387	.289	.33
November	56,800	145	3,630	2.71	3.02
December	12,900	555	1,940	1.45	1.67
January	21,100	620	2,380	1.78	2.05
February	2,390	600	1,110	.828	.86
March	12,300	600	2,690	2.01	2.32
April	20,400	1,550	6,410	4.78	5.33
May	19,300	870	4,470	3.34	3.85
June	20,000	930	3,970	2.96	3.30
July	4,100	280	1,270	.948	1.09
August	2,500	238	849	.634	.73
September	2,090	280	693	.517	.58
The year	56,800	104	2,480	1.85	25.13
1901-2.					
October	315	153	228	0.170	0.20
November	422	119	188	.140	.16
December	36,700	238	4.850	3.62	4.17
January	12,900	470	2,630	1.96	2.26
February	29,600	600	4,410	3.29	3.43
March	30,700	1,640	7,500	5.60	6.46
April	7,940	755	3,170	2.37	2.64
May	2,930	390	828	.618	.71
June	4,100	301	682	.509	.57
July	930	165	414	.309	.36
August	280	66	138	.103	.12
September	164	70	91.4	.608	.08
The year	36,700	66	2,090	1.56	21.16
1902-3.					
October	415	76	151	.113	.13
November	3,100	51	456	.340	.38
December	7,360	598	2,730	2.04	2.35
January	23,100	576	3,840	2.87	3.31
February	24,900	1,720	6,880	5.13	5.34
March	31,100	1,160	6,300	4.70	5.42
April	10,000	1,920	3,410	2.54	2.83
May	2,620	315	870	.649	.75
June	8,810	396	1,750	1.31	1.46
July	2,500	128	760	.567	.65
August	788	58	238	.178	.21
September	301	79	161	.120	.13
The year	31,100	51	2,270	1.69	22.96

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1903-4.					
October	246	101	149	.111	.13
November	246	70	150	.112	.12
December	490	101	183	.137	.16
January	15,400	217	1,580	1.18	1.36
February	9,400	246	2,330	1.74	1.88
March	10,000	1,420	3,660	2.73	3.15
April	8,810	659	2,280	1.70	1.90
May	15,700	788	2,800	2.09	2.41
June	7,360	396	1,360	1.01	1.13
July	1,160	140	352	.263	.30
August	188	86	141	.105	.12
September	188	46	86.4	.064	.07
The year	15,700	46	1,250	.933	12.73
1904-5.					
October	101	46	60.5	.045	.05
November	101	46	83.4	.062	.07
December	2,380	70	415	.310	.36
January	5,690	315	1,170	.873	1.01
February	1,520	246	693	.517	.54
March	25,600	1,000	7,030	5.25	6.05
April	3,600	855	1,610	1.20	1.34
May	28,400	720	3,920	2.93	3.38
June	5,960	246	1,020	.761	.85
July	12,900	544	2,510	1.87	2.16
August	1,080	315	616	.460	.53
September	928	101	287	.214	.24
The year	28,400	46	1,640	1.22	16.58
1905-6.					
October	1,620	70	274	.204	.24
November	598	188	321	240	.27
December	11,300	490	2,420	1.81	2.09
January	21,100	1,080	4,990	3.72	4.29
February	2,140	315	841	.628	.65
March	13,300	544	4,750	3.54	4.08
April	7,940	1,240	3,490	2.60	2.90
May	2,500	855	1,360	1.01	1.16
June	2,860	396	1,070	.799	.89
1907.					
May 19-31	5,960	720	1,680	1.25	1.02
June	41,200	1,160	6,050	4.51	5.03
July	6,240	490	1,430	1.07	1.23
August	4,880	164	781	.583	.67
September	3,350	315	963	.719	.80
1907-8.					
October	7,940	280	976	.728	.84
November	9,400	396	3,470	2.59	2.89
December	19,600	598	4,260	3.18	3.67
January	21,800	1,420	4,610	3.44	3.97
February	39,600	1,000	5,270	3.93	4.24
March	25,300	1,520	7,700	5.75	6.63
April	26,000	2,040	5,450	4.07	4.54
May	21,500	1,720	5,280	3.94	4.54
June	5,150	396	1,300	.970	1.08
July	4,620	188	1,310	.978	1.13
August	2,140	217	675	.504	.58
September	443	101	183	.137	.15
The year	39,600	101	3,370	2.51	34.26

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.
[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1908-9.					
October	720	101	183	.137	.16
November	598	140	261	.195	.22
December	5,150	164	1,080	.806	.93
January	11,300	1,240	3,870	2.89	3.33
February	12,300	788	4,130	3.08	3.21
March	10,600	1,520	4,100	3.06	3.53
April	15,000	1,160	3,790	2.83	3.16
May	7,080	855	3,280	2.45	2.82
June	2,140	490	1,080	.806	.90
July	3,600	188	753	.562	.65
August	2,380	140	422	.315	.36
September	544	101	193	.144	.16
The year	15,000	101	1,920	1.43	19.43
1909-10.					
October	1,520	86	391	.292	.34
November	1,720	188	447	.334	.37
December	9,700	246	1,190	.888	1.02
January	14,500	490	3,150	2.35	2.71
February	14,300	720	2,960	2.21	2.30
March	11,300	696	2,390	1.78	2.05
April	3,480	598	1.870	1.40	1.56
May	2,380	855	1,350	1.01	1.16
June	34,500	747	5,750	4.29	4.79
July	4,880	380	1,250	.933	1.08
August	696	178	268	.200	.23
September	1,820	164	610	.455	.51
The year	34,500	86	1,790	1.34	18.12
1910-11.					
October	622	178	284	.212	.24
November	788	150	230	.172	.19
December	8,660	200	1,010	.754	.87
January	35,100	1,160	7,040	5.25	6.05
February	9,100	1,130	2,910	2.17	2.26
March	9,400	1,240	4,380	3.27	3.77
April	17,800	1,720	5,780	4.31	4.81
May	1,720	315	747	.557	.64
June	971	315	522	.390	.44
July	471	101	231	.172	.20
August	443	86	196	.146	.17
September	3,850	246	975	.728	.81
The year	35,100	86	2,020	1.51	20.45
1911-12.					
October	18,200	315	2,600	1.94	2.24
November	10,300	415	2,200	1.64	1.83
December	6,800	708	2,200	1.64	1.89
January	10,000	....	2,230	1.66	1.91
February	17,800	659	3,510	2.62	2.83
March	31,100	1,400	6,950	5.19	5.98
April	9,700	1,140	2,960	2.21	2.47
May	18,200	587	4,010	2.99	3.45
June	2,040	188	498	.372	.42
July	6,800	396	1,040	.776	.89
August	490	105	213	.159	.18
September	2,980	68	395	.295	.33
The year	31,100	68	2,400	1.79	24.42

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Continued.

[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1912-13.					
October	490	145	257	.192	.22
November	5,690	188	759	.566	.63
December	12,900	178	1,050	.784	.90
January	14,300	1,240	4,270	3.19	3.68
February	7,360	774	2,190	1.63	1.70
March	42,500	870	6,430	4.80	5.53
April	19,300	913	3,900	2.91	3.25
May	15,700	544	2,770	2.07	2.39
June	5,690	356	1,660	1.24	1.38
July	8,230	380	1,150	.858	.99
August	2,860	164	645	.481	.55
September	443	113	189	.141	.16
The year	42,500	113	2,110	1.57	21.38
1913-14.					
October	7,080	164	1,200	.896	1.03
November	14,300	380	2,930	2.19	2.44
December	6,520	696	2,270	1.69	1.95
January	9,700	1,230	3,280	2.45	2.82
February	14,000	1,130	4,420	3.30	3.44
March	13,300	1,480	4,670	3.49	4.02
April	12,600	1,920	4,780	3.57	3.98
May	3,220	308	1,220	.910	1.05
June	659	140	241	.180	.20
July	1,000	164	305	.228	.26
August	1,130	124	287	.214	.25
September	512	95	217	.162	.18
The year	14,300	95	2,130	1.59	21.62
1914-15.					
October	1,080	64	270	.201	.23
November	311	111	167	.125	.14
December	8,900	169	3,660	2.73	3.15
January	26,300	1,080	7,030	5.25	6.05
February	27,800	1,340	6,320	4.72	4.92
March	2,500	790	1,330	.993	1.14
April	1,250	526	802	.599	.67
May	1,250	239	606	.452	.52
June	7,500	179	1,300	.970	1.08
July	374	122	223	.166	.19
August	916	126	456	.340	.39
September	1,000	158	431	.322	.36
The year	27,800	64	1,860	1.39	18.84
1915-16.					
October	18,500	253	1,730	1.29	1.49
November	2,090	179	634	.473	.53
December	18,500	294	2,450	1.83	2.11
January	13,400	1,160	3,650	2.72	3.14
February	8,050	1,250	3,530	2.63	2.84
March	7,500	1,510	3,250	2.43	2.80
April	6,680	1,160	2,600	1.94	2.16
May	5,580	452	1,250	.933	1.08
June	12,200	526	2,370	1.77	1.98
July	3,480	423	1,120	.836	.96
August	7,220	328	1,620	1.21	1.40
September	2,810	164	409	.305	.34
The year	18,500	164	2,050	1.53	20.83

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1895-1917—Concluded.
[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1916-17.					
October	2,190	225	599	0.447	0.52
November	902	179	306	.228	.25
December	15,200	277	1,600	1.19	1.37
January	13,700	1,080	3,580	2.67	3.08
February	12,800	738	3,480	2.60	2.71
March	27,200	1,990	9,900	7.39	8.52
April	6,950	777	2,090	1.56	1.74
May	12,500	615	2,450	1.83	2.11
June	2,600	204	940	.701	.78
July	3,030	118	462	.345	.40
August	846	74	216	.161	.19
September	649	79	164	.122	.14
The year	27,200	74	2,150	1.60	21.81

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1918-1922.
[Drainage area 1,340 square miles.]

Month	Maximum	Minimum	Mean	Per square mile	Run-off in inches
1917-18.					
October	4,760	100	515	0.384	0.44
November	2,600	148	447	.334	.37
December	1,600	....	481	.359	.41
January	11,000	....	1,700	1.27	1.46
February	16,100	1,600	7,500	5.60	5.83
March	48,000	1,740	7,100	5.30	6.11
April	12,700	1,500	5,720	4.27	4.76
May	6,280	1,580	2,520	1.88	2.17
June	17,600	314	2,510	1.87	2.09
July	6,280	449	1,340	1.00	1.15
August	2,090	273	802	.598	.69
September	7,730	449	1,520	1.13	1.26
The year	48,000	100	2,640	1.97	26.74
1918-19					
October	24,100	238	1,760	1.31	1.51
November	10,900	676	2,160	1.61	1.80
December	17,600	1,130	4,240	3.16	3.64
January	39,400	1,660	6,310	4.71	5.43
February	8,310	760	2,190	1.63	1.70
March	13,600	1,360	3,510	2.62	3.02
April	7,730	1,280	2,520	1.88	2.10
May	14,800	1,660	4,660	3.48	4.01
June	13,900	606	2,480	1.85	2.06
July	13,900	830	3,480	2.60	3.00
August	1,740	227	641	.478	.55
September	788	151	258	.193	.22
The year	39,400	151	2,870	2.14	29.04
1919-20					
October	3,970	140	787	.587	.68
November	9,470	413	1,810	1.35	1.51
December	22,200	....	4,040	3.01	3.47
January	19,200	....	4,010	2.99	3.45
February	6,570	1,430	2,580	1.93	2.08
March	21,900	1,500	4,950	3.69	4.25
April	9,760	1,580	4,530	3.38	3.77
May	5,700	1,060	1,810	1.35	1.56
June	10,300	499	1,870	1.40	1.56
July	2,920	243	908	.678	.78
August	5,990	180	939	.701	.81
September	486	130	223	.166	.19
The year	22,200	130	2,370	1.77	24.11

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1918-1922—Concluded.

[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1920-21					
October	620	123	215	.160	.18
November	3,690	158	945	.705	.79
December	10,600	1,200	2,780	2.07	2.39
January	9,760	980	2,550	1.90	2.19
February	9,180	1,130	2,150	1.60	1.67
March	9,180	905	2,540	1.90	2.19
April	1,430	592	889	.663	.74
May	3,160	499	1,260	.940	1.08
June	2,690	216	592	.442	.49
July	1,200	144	343	.256	.30
August	537	100	247	.184	.21
September	1,200	95	279	.208	.23
The year	10,600	95	1,230	.918	12.46
1921-22					
October	371	100	152	.113	.13
November	17,900	662	3,420	2.55	2.84
December	18,200	....	4,800	3.58	4.13
January	13,900	980	3,070	2.29	2.64
February	20,700	1,280	4,890	3.65	3.80
March	13,900	1,580	6,070	4.53	5.22
April	5,120	1,060	2,370	1.77	1.98
May	9,180	1,130	2,850	2.13	2.46
June	5,410	760	2,180	1.63	1.82
July	7,150	402	1,340	1.00	1.15
August	2,690	254	630	.470	.54
September	1,580	123	378	.282	.31
The year	20,700	100	2,670	1.99	27.02
1922-23					
October	314	111	156	0.116	0.13
November	176	111	131	.0978	.11
December	12,100	106	2,450	1.83	2.11
January	14,800	1,200	3,440	2.57	2.96
February	17,600	648	3,800	2.84	2.96
March	14,800	1,130	4,310	3.22	3.71
April	10,900	760	2,710	2.02	2.25
May	2,800	760	1,260	.940	1.08
June	4,250	307	958	.715	.80
July	802	111	245	.183	.21
August	11,500	190	1,890	1.41	1.63
September	1,280	167	451	.337	.38
The year	17,600	106	1,810	1.35	18.33

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1923-1934.

[Drainage area 1,340 square miles.]

1923-24					
October	266	117	169	0.126	0.15
November	1,280	144	491	.366	.41
December	9,470	905	2,590	1.93	2.22
January	21,300	1,360	4,670	3.49	4.02
February	6,860	830	2,170	1.62	1.75
March	19,800	1,430	4.520	3.37	3.88
April	6,860	1,200	2,970	2.22	2.48
May	25,000	1,130	4.710	3.52	4.06
June	7,150	537	2,420	1.81	2.02
July	4,830	227	1,000	.749	.86
August	7,440	195	1,310	.975	1.12
September	12,400	210	848	.633	.71
The year	25,000	117	2,330	1.74	23.68

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1923-1934—Continued.
[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1924-25					
October	13,000	179	1,250	0.933	1.08
November	4,540	188	911	.680	.76
December	13,300	366	2,130	1.59	1.83
January	9,470	1,280	3,260	2.43	2.80
February	9,760	1,280	3,950	2.95	3.07
March	13,900	606	2,070	1.54	1.78
April	5,700	537	1,550	1.16	1.29
May	6,570	461	2,250	1.68	1.94
June	1,360	271	684	.510	.57
July	648	128	325	.243	.28
August	194	84	137	.102	.12
September	106	71	85.9	.064	.07
The year	13,900	71	1,540	1.15	15.59
1925-26					
October	5,410	101	1,150	0.858	0.99
November	3,690	746	1,790	1.34	1.50
December	5,120	405	931	.695	.80
January	19,800	....	3,200	2.39	2.76
February	16,700	1,580	4,440	3.31	3.45
March	8,600	1,580	3,240	2.42	2.79
April	4,250	1,360	2,250	1.68	1.87
May	1,200	376	646	.482	.56
June	2,090	248	836	.624	.70
July	2,380	109	430	.321	.37
August	12,100	112	1,700	1.27	1.46
September	816	128	365	.272	.30
The year	19,800	101	1,730	1.29	17.55
1926-27					
October	2,000	295	1,240	0.925	1.07
November	15,100	816	3,030	2.26	2.52
December	30,400	1,580	6,260	4.67	5.38
January	8,020	....	2,560	1.91	2.20
February	18,800	2,480	6,940	5.18	5.39
March	7,440	980	2,240	1.67	1.92
April	15,100	2,090	5,550	4.14	4.62
May	10,000	1,060	2,370	1.77	2.04
June	2,920	356	1,340	1.00	1.12
July	634	188	344	.257	.30
August	2,090	212	996	.743	.86
September	1,280	118	275	.205	.23
The year	30,400	118	2,730	2.04	27.65
1927-28					
October	2,920	106	690	0.515	0.58
November	8,330	295	1,900	1.42	1.58
December	6,860	537	2,800	2.09	2.41
January	11,900	905	2,950	2.20	2.54
February	7,440	1,060	2,430	1.81	1.95
March	11,600	760	2,860	2.13	2.46
April	12,700	1,200	2,620	1.96	2.19
May	16,400	732	2,370	1.77	2.04
June	9,800	802	2,340	1.75	1.95
July	9,370	287	1,770	1.32	1.52
August	8,760	242	1,470	1.10	1.27
September	3,970	271	983	.734	.82
The year	16,400	106	2,100	1.57	21.31

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1928-1934—Continued.

[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1928-29					
October	1,660	200	519	0.387	0.45
November	4,800	425	1,150	.858	.96
December	21,400	816	2,780	2.07	2.39
January	9,500	905	2,890	2.16	2.49
February	29,100	905	3,320	2.48	2.58
March	20,700	2,000	5,860	4.37	5.04
April	6,280	1,060	2,750	2.05	2.29
May	17,300	1,360	4,310	3.22	3.71
June	5,410	500	1,280	.955	1.07
July	2,380	128	436	.325	.37
August	704	92	182	.136	.16
September	115	80	94.3	.0704	.08
The year	29,100	80	2,130	1.59	21.59
1929-30					
October	12,200	188	1,960	1.46	1.68
November	26,600	1,160	4,390	3.28	3.66
December	6,600	954	2,440	1.82	2.10
January	3,200	664	1,420	1.06	1.22
February	8,700	620	2,430	1.81	1.88
March	8,100	941	2,450	1.83	2.11
April	6,450	600	1,800	1.34	1.50
May	928	250	546	.407	.47
June	1,790	116	318	.237	.26
July	123	43	67.0	.050	.06
August	61	28	43.6	.033	.04
September	43	30	34.8	.026	.03
The year	26,600	28	1,480	1.10	15.01
1930-31					
October	58	28	36.6	0.027	0.03
November	100	40	67.0	.050	.06
December	493	53	171	.128	.15
January	2,870	202	687	.513	.59
February	3,990	310	1,340	1.00	1.04
March	9,300	610	2,630	1.96	2.26
April	13,800	928	4,020	3.00	3.35
May	12,900	838	3,500	2.61	3.01
June	4,140	413	1,120	.836	.93
July	928	269	481	.359	.41
August	4,650	173	1,150	.858	.99
September	1,360	147	408	.304	.34
The year	13,800	28	1,300	.970	13.16
1931-32					
October	580	116	191	0.143	0.16
November	163	110	127	.095	.11
December	4,020	202	1,540	1.15	1.33
January	13,600	754	3,310	2.47	2.85
February	37,100	1,230	4,910	3.66	3.95
March	19,300	980	5,330	3.98	4.59
April	12,300	790	2,780	2.07	2.31
May	21,800	484	3,670	2.74	3.16
June	13,400	244	1,330	.993	1.11
July	14,800	183	2,290	1.64	1.89
August	310	78	180	.134	.15
September	188	45	89.4	.067	.07
The year	37,100	45	2,130	1.59	21.68

Monthly discharge of Greenbrier River at Alderson, W. Va., for the years ending Sept. 30, 1923-1934—Concluded.
[Drainage area 1,340 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1932-33					
October	2,480	81	490	0.366	0.42
November	13,500	580	2,460	1.84	2.05
December	13,300	370	2,300	1.72	1.98
January	13,100	1,100	3,380	2.52	2.90
February	15,400	2,080	5,140	3.84	4.00
March	23,400	1,260	5,110	3.81	4.39
April	10,200	1,210	4,100	3.06	3.41
May	9,900	995	3,270	2.44	2.81
June	1,480	207	635	.474	.53
July	12,300	197	1,400	1.04	1.20
August	4,950	282	1,250	.933	1.08
September	778	123	292	.218	.24
The year	23,400	81	2,470	1.84	25.01
1933-34					
October	203	88	119	0.089	0.10
November	520	109	226	.169	.19
December	5,780	284	1,054	.787	.91
January	8,960	310	1,705	1.27	1.46
February	548	251	410	.306	.32
March	32,200	520	7,709	5.75	6.63
April	9,270	858	2,380	1.78	1.99
May	2,160	362	726	.542	.62
June	502	141	281	.210	.23
July	993	53	192	.143	.16
August	457	82	203	.151	.17
September	2,550	48	335	.250	.28
The year	32,200	48	1,291	.963	13.06

GREENBRIER RIVER AT ALDERSON, W. VA.

Location.—Water-stage recorder, lat. 37°43′50″, long. 80°38′30″, 400 feet above highway bridge at Alderson, Monroe County, and half a mile above the mouth of Muddy Creek. Zero of gage is 1,528.97 feet above mean sea level.

Drainage area.—1,357 square miles (revised).

Records available.—July 1895 to June 1906, May 1907 to September 1935.

Average discharge.—38 years (1895-1905, 1907-35), 2,080 second-feet.

Extremes.—Maximum discharge during year, about 48,500 second-feet Jan. 23 (gage height, 16.85 feet); minimum, 154 second-feet Oct. 30 (gage height, 2.04 feet). 1895-1935: Maximum observed discharge, about 70,000 second-feet (revised) Mar. 13, 14, 1918 (gage height, 22.0 feet); minimum, 26 second-feet part of Aug. 12, Oct. 1, 2, 1930 (gage height, 1.65 feet).

Remarks.—Records good except those for Dec. 11-17, Jan. 2-12, Mar. 19-27, and June 5 to July 1, which are fair and were estimated on basis of records for stations at Buckeye.

Rating table, water year 1934-35 (gage height, in feet, and discharge in second-feet)

2.0	136	3.4	1,630	8.0	14,300
2.1	182	3.6	1,990	9.0	17,900
2.2	234	3.8	2,380	10.0	21,600
2.3	290	4.0	2,790	11.0	25,300
2.4	355	4.5	3,910	12.0	29,100
2.6	520	5.0	5,100	13.0	33,000
2.8	725	5.5	6,350	14.0	37,000
3.0	980	6.0	7,640	15.0	41,100
3.2	1,290	7.0	10,750	16.0	45,200

Discharge, in second-feet, water year October, 1934 to September, 1935.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1........	3,800	256	17,500	2,120	1,430	4,020	23,800	872	1,300	1,300	845	256
2........	1,810	378	12,900	2,300	1,340	3,230	16,800	833	1,080	1,380	725	245
3........	1,040	439	6,350	1,900	1,440	2,600	8,780	912	899	773	596	245
4........	681	530	4,260	1,600	1,480	2,140	7,380	1,260	926	737	3,350	528
5........	520	577	3,450	1,500	1,360	1,920	6,600	1,610	2,000	773	3,120	10,600
6........	2,050	692	2,680	1,400	1,210	2,120	5,100	1,740	1,600	1,230	1,920	18,300
7........	4,140	953	2,200	1,300	1,120	2,480	5,850	10,200	1,300	1,560	1,600	7,120
8........	2,500	1,210	1,830	1,300	1,060	2,440	8,480	13,900	1,100	14,700	12,000	4,140
9........	1,460	1,040	1,510	1,500	966	2,100	8,190	6,600	1,000	19,400	7,120	2,790
10........	966	797	1,260	5,500	2,270	1,850	6,350	4,380	1,200	8,190	4,020	2,010
11........	725	648	1,100	3,800	5,600	3,580	4,980	3,340	1,100	4,020	3,450	1,460
12........	568	548	850	3,200	4,740	16,800	4,740	2,640	900	2,790	4,140	1,120
13........	466	466	750	2,680	3,560	20,500	5,600	2,260	800	2,070	2,540	872
14........	385	415	850	2,280	3,120	10,400	5,850	2,120	800	1,530	1,770	703
15........	329	385	900	1,900	6,220	6,220	4,740	2,120	700	1,830	1,580	596
16........	290	336	800	1,700	8,480	4,620	3,800	2,300	1,200	1,490	1,120	530
17........	262	322	600	4,500	7,120	3,450	3,120	3,010	1,000	1,100	858	466
18........	240	290	690	9,410	5,350	2,900	2,520	3,450	800	995	681	415
19........	224	268	692	6,220	4,020	2,800	2,260	2,900	800	785	586	385
20........	213	262	1,320	4,860	3,120	2,800	2,010	2,320	700	615	530	355
21........	198	262	1,970	7,380	2,500	2,700	1,900	2,120	600	520	475	336
22........	192	256	1,880	20,100	2,050	2,700	1,810	2,620	500	953	475	329
23........	187	426	1,560	41,900	1,950	3,000	1,580	2,900	450	714	568	355
24........	177	4,500	1,310	18,600	2,420	13,000	1,380	2,000	500	681	586	355
25........	164	5,100	1,180	7,910	2,640	13,500	1,210	3,450	450	725	466	303
26........	164	2,900	1,490	5,480	3,560	17,000	1,070	3,450	375	1,940	370	279
27........	168	1,900	7,380	4,140	7,120	9,300	966	2,790	300	5,480	322	251
28........	168	1,480	5,850	2,790	5,600	6,100	912	2,220	275	4,140	290	234
29........	159	11,400	3,910	2,240	....	4,860	899	1,790	240	2,460	284	218
30........	154	16,100	2,900	1,990	....	3,910	912	1,540	300	1,580	268	203
31........	159	....	2,340	1,610	....	9,130	....	1,490	....	1,080	273	....

Month	Second-foot-days	Maximum	Minimum	Mean	Per square mile	Run-off in inches
October	24,559	4,140	154	792	0.584	0.67
November	55,136	16,100	256	1,838	1.35	1.51
December	94,262	17,500	600	3,041	2.24	2.58
Calendar year 1934........	601,895	32,200	48	1,649	1.22	16.62
January	175,110	41,900	1,300	5,649	4.16	4.80
February	92,846	8,480	966	3,316	2.44	2.54
March	184,170	20,500	1,850	5,941	4.38	5.05
April	149,589	23,800	899	4,986	3.67	4.10
May	96,037	13,900	833	3,098	2.28	2.63
June	25,235	2,000	240	841	.620	.69
July	87,541	19,400	520	2,824	2.08	2.40
August	56,928	12,000	268	1,836	1.35	1.56
September	55,999	18,300	203	1,867	1.38	1.54
Water year 1934-35........	1,097,412	41,900	154	3,007	2.22	30.07

The following summary of flood stages and discharges for the Greenbrier River at Alderson is taken from the United States Geological Survey Water Supply Paper No. 771, pages 185-186. The base discharge assumed as flood level is 15,000 second-feet.

Date			Gage Height (Feet)	Discharge (second-feet)
1896	Mar.	30	10.5	25,600
	Nov.	6	9.5	21,800
1897	Feb.	23	....	51,500
		23	17.5 P	54,000
	May	14	12.2	32,300
1898	Jan.	16	7.8	15,700
	Mar.	30	8.0	16,400
	May	7	8.0	16,400
	Aug.	11	14.8	42,900
	Oct.	22	9.8	23,000
1899	Jan.	7	8.6	18,600
	Feb.	27	8.6	18,600
	Mar.	5	15.4	45,300
1900	Feb.	14	7.9	16,000
	Mar.	21	8.2	17,100
	Nov.	26	18.2	56,800
1901	Jan.	12	9.3	21,100
	Apr.	21	9.1	20,400
	May	23	8.4	17,800
		28	8.8	19,300
	June	17	9.0	20,000
	Dec.	15	13.3	36,700
		30	11.1	28,000
1902	Feb.	26	....	17,800
	Mar.	1	11.8	30,700
		14	7.8	15,700
		17	....	15,000
		30	7.8	15,700
1903	Jan.	3	9.9	23,100
	Feb.	5	8.9	19,600
		17	10.3	24,900
	Mar.	1	10.0	23,800
		24	11.9	31,100
1904	Jan.	23	7.7	15,400
	May	19	7.8	15,700
1905	Mar.	10	10.5	25,600
		22	7.6	15,000
	May	12	11.2	28,400
1906	Jan.	23	9.3	21,100
	....		....	....
1907	June	14	14.4	41,200
	Dec.	11	7.8	15,700
		24	8.9	19,600
1908	Jan.	12	9.5	21,800
	Feb.	16	14.0	39,600
	Mar.	7	10.4	25,300
	Apr.	1	10.6	26,000
	May	8	9.4	21,500
1909	Apr.	15	7.6	15,000
1910	June	17	12.8	34,500
1911	Jan.	4	9.9	23,100
		30	12.9	35,100
	Apr.	5	8.4	17,800
	Oct.	18	8.5	18,200
1912	Feb.	22	8.1	16,800
		27	8.4	17,800
	Mar.	16	11.9	31,100
		29	8.3	17,500
	May	13	8.3	17,500
		17	8.5	18,200
1913	Mar.	15	8.2	17,100
	Mar.	27	14.7	42,500
	Apr.	13	8.8	19,300
		15	....	17,100
	May	28	7.8	15,700
	Nov.	17	**	14,300
1914	Feb.	20	**	14,000
1915	Jan.	7	11.7	26,300
	Feb.	2	12.2	27,800
		2	14.5 P	34,900
	Oct.	2	9.11	18,500
		2	11.3 P	25,100
	Dec.	30	9.09	18,500
1916	Dec.	29	8.0	15,200
1917	Mar.	4	....	27,200
		4	14.2 P	34,000
		13	9.8	20,600
1918	Feb.	14	8.00	15,200
		16	8.14	15,500
		21	8.30	16,100
	Mar.	14	18.62	48,000
		14	22 P	58,900
	June	26	9.00	17,600
		26	10.8 P	23,600
	Oct.	31	11.15	24,100
		31	11.9 P	26,900
	Dec.	23	8.99	17,600
		23	11.0 P	24,200
1919	Jan.	2	15.90	39,400
		2	16.3 P	40,700
	Dec.	7	14.0 P	33,300
		8	10.52	22,200
1920	Jan.	25	9.49	19,200
	Mar.	20	10.41	21,900
	Dec.	15	6.68**	10,600
1921	Nov.	1	9.12	17,900
		29	8.68	16,700
	Dec.	25	9.25	18,200
1922	Feb.	21	10.00	20,700
		21	10.5 P	22,200
1923	Feb.	2	8.96	17,600
		2	9.58 P	19,500
1924	Jan.	4	8.18	15,100
		17	10.22	21,300
	Mar.	30	9.68	19,800
	May	12	11.40	25,000
		12	13.60 P	32,000
1925	Mar.	20	7.75**	13,900
1926	Jan.	20	9.72	19,800
		20	9.95 P	20,700
		22	8.48	16,000
	Feb.	15	8.68	16,700
	Nov.	17	8.15	15,100
	Dec.	22	10.68	22,900
		26	13.11	30,400
		26	14.50 P	34,900
1927	Feb.	6	9.38	18,800
		20	9.02	17,600
		23	8.28	15,400
	Apr.	10	8.25	15,100
1928	May	1	8.66	16,400
		1	9.0 P	18,000
	Dec.	1	9.95	21,400
1929	Feb.	28	12.22	29,100
		28	13.15 P	32,700
	Mar.	6	9.70	20,400
	May	21	8.70	17,300
	Nov.	18	....	26,600
		18	14.20 P	36,300
1930	Feb.	6	6.05**	8,700
1931	Apr.	5	7.74**	13,800
1932	Feb.	5	....	37,100
		5	16.96 P	46,400
	Mar.	18	....	16,000
		29	....	19,300
	May	2	....	21,800
1933	Feb.	21	....	15,400
	Mar.	20	10.64	23,400
		20	11.68 P	27,300
1934	Mar.	5	12.76	32,200
		5	13.21 P	33,800
		9	....	16,000
		28	10.85	24,600

**—Below base.

Note.—All discharge quantities are average daily flows except as designated by "P" (momentary peak).

Meadow River.—Meadow River, which drains about one-sixth of Greenbrier County, has a meandering length of 52.58 miles, of which about 41 miles is within or along the border of the County. It has its source in eastern Summers County at an elevation of approximately 2800 feet and empties into Gauley River at Carnifex Ferry, Nicholas County, at an elevation of about 1180 feet. The rate of fall is not uniform from the source to the mouth as the following table shows:

Gradient of Meadow River.

	Miles	Elevation	Fall, Feet	Fall per Mile, Feet
Source		2800		
Distance	0.3		100	333.0
Summers-Greenbrier line		2700		
Distance	2.7		265	9.8
Grassy Meadows		2435		
Distance	13.3		40	3.0
Rupert		2395		
Distance	6.7		20	3.0
East Rainelle		2375		
Distance	18.3		500	27.3
Corner of Fayette-Greenbrier-Nicholas		1875		
Distance	11.3		695	61.5
Mouth		1180		

The above table emphasizes the local base-leveling along Meadow River.*

* See page 35.

A gaging station was established near Russellville, July 17, 1908, for which the following records are available, being taken from the various Water Supply Papers of the United States Geological Survey previously quoted under the description of Greenbrier River. The station was discontinued in 1916 and reestablished in 1928:

Meadow River near Russellville, W. Va.

Location.—At Bays Ferry, one-fourth mile below mouth of Youngs Creek and 3 miles below Russellville, Fayette County.

Drainage Area.—297 square miles.

Records available.—July 17, 1908 to September 30, 1916, when station was discontinued.

Gage.—Chain gage attached to trees on left bank 25 feet above bridge, near former ferry crossing, read by J. R. Bays.

Discharge measurements.—Made from bridge or by wading. Prior to completion of concrete bridge in 1913 high-water measurements were made from boat.

Channel and control.—Channel straight above and slightly curved for 200 feet below gage. Left bank subject to overflow at extremely high stages. Bed rocky and clean. Control permanent.

Extremes of discharge.—1908-1916: Maximum stage recorded, 13.25 feet morning reading February 3, 1915 (discharge about 7,300 second-feet); minimum stage recorded. 2.57 feet August 7, 8, 1914 (discharge, 6.7 second feet).

Ice.—Stage-discharge relation affected by ice for short periods in severe winters.

Accuracy.—Stage-discharge relation practically permanent, occasionally affected by ice. Rating curve well defined between 12 and 4,800 second-feet; beyond these limits the curve is an extension. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. See foot-note to table of daily discharge for special estimates. Records good.

Discharge measurements of Meadow River near Russellville, W. Va., during the years 1908-1916

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	Sec.-ft.			Feet.	Sec.-ft.
1908.				1912.			
July 18	Wm. M. O'Neill	4.07	154	Mar. 27	C. T. Bailey	7.02	1,370
Aug. 7	W. G. Hoyt	3.75	68	30	do	9.44	3,230
1909.				1913.			
Apr. 5	H. J. Jackson	5.82	686	Nov. 18	Peterson and Walters	9.04	2,830
13	do	4.55	260	20	M. I. Walters	6.50	1,050
1910.				1914.			
Mar. 24	C. T. Bailey	4.46	233	Oct. 30	Mathers and Morgan.	3.39	49.0
26	do	4.30	216	30	do	3.36	44.7
Oct. 14	do	3.54	62.9				
15	do	3.39	47.1	1916.			
				Aug. 21	B. E. Jones	5.01	376
1911.				24	do	5.70	632
July 29	do	2.93	15.2				

Daily discharge, in second-feet, of Meadow River near Russellville, W. Va., for the years ending Sept. 30, 1908-1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1908.				1908.				1908.			
1	....	202	47	11	....	324	22	21	138	48	13
2	....	148	41	12	....	226	20	22	134	45	13
3	....	118	34	13	....	148	20	23	191	45	12
4	....	97	30	14	....	116	19	24	148	44	12
5	....	83	28	15	....	96	19	25	133	45	12
6	....	92	28	16	....	86	17	26	138	60	12
7	....	86	28	17	....	82	16	27	406	238	11
8	....	78	27	18	....	75	15	28	765	158	11
9	....	169	25	19	158	62	15	29	580	106	11
10	....	470	24	20	148	56	14	30	364	75	11
								31	274	59	....

Daily discharge, in second-feet, of Meadow River near Russellville, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908-9.												
1	10	127	47	1,200	920	670	765	2,070	311	202	54	14
2	11	91	58	975	715	540	625	2,070	250	505	64	13
3	11	62	48	625	580	505	625	1,640	226	378	115	12
4	12	47	47	470	505	920	580	1,140	226	298	68	14
5	12	39	45	765	505	920	715	865	286	202	58	26
6	12	34	44	2,150	580	865	715	625	311	337	44	25
7	12	30	70	1,710	580	1,260	625	505	311	975	36	37
8	12	28	180	1,200	540	2,150	505	470	250	765	31	33
9	12	28	250	815	505	2,390	406	470	226	540	29	33
10	13	26	238	540	1,140	3,060	378	670	274	406	33	68
11	15	25	202	438	1,570	2,470	324	1,570	364	250	32	250
12	16	26	715	406	1,200	1,570	286	1,260	438	191	28	238
13	17	28	920	364	1,030	1,140	262	975	378	169	23	158
14	20	32	580	324	920	1,260	2,550	670	505	286	22	88
15	34	32	438	1,200	865	1,200	2,550	470	580	238	29	59
16	37	30	337	1,990	1,640	920	1,640	378	505	169	214	46
17	28	30	250	1,780	1,850	715	1,080	324	378	125	505	42
18	28	35	298	1,440	1,320	540	715	274	406	97	337	46
19	26	34	580	1,080	1,030	438	505	226	350	115	202	71
20	24	44	580	815	1,080	406	438	202	262	100	129	54
21	23	129	438	765	1,080	378	406	202	214	88	80	38
22	22	138	364	815	1,440	505	865	274	191	73	56	32
23	20	111	337	815	1,380	540	1,570	324	158	73	40	29
24	20	91	286	865	1,260	580	1,710	286	180	97	35	33
25	19	73	274	715	1,380	1,140	1,320	238	202	127	28	148
26	19	62	438	625	1,200	1,990	975	364	180	44	23	86
27	19	57	438	580	1,030	1,920	715	765	136	73	22	62
28	19	53	406	505	865	2,550	625	815	118	70	21	48
29	37	51	406	470	....	2,150	580	765	102	59	19	43
30	47	47	470	438	....	1,500	765	540	131	61	17	23
31	158	....	1,260	920	....	1,030	....	406	....	54	16	....
1909-10.												
1	25	89	85	106	600	2,150	133	580	262	214	67	29
2	24	83	82	148	600	2,150	125	438	262	169	52	73
3	22	75	80	2,200	865	1,710	133	364	238	158	50	180
4	19	72	78	2,150	865	1,260	148	337	226	202	48	138
5	17	62	75	1,500	625	920	337	298	286	180	46	350
6	16	56	67	1,080	700	670	324	274	2,630	250	42	337
7	16	50	67	2,470	700	580	286	238	2,710	350	38	226
8	16	47	86	1,920	765	470	250	274	1,570	438	37	148
9	16	58	109	1,320	670	406	214	470	1,500	262	36	115
10	18	78	94	1,080	625	378	180	670	715	286	33	106
11	27	364	96	1,250	580	350	169	625	1,080	226	27	89
12	88	337	124	1,250	505	324	214	765	1,380	180	28	72
13	214	250	202	1,440	470	324	670	1,140	1,920	226	41	109
14	158	214	815	1,200	438	540	865	865	1,710	286	45	180
15	122	169	815	1,030	406	625	670	625	1,640	274	37	262
16	88	148	715	765	505	505	540	470	2,790	226	79	169
17	75		438	765	2,470	438	470	406	3,510	214	64	106
18	72		470	765	2,630	378	1,030	378	2,390	262	37	65
19	78		505	1,990	2,150	311	1,200	406	1,640	505	35	53
20	58		378	1,570	1,570	262	1,140	378	920	540	40	51
21	52		274	1,780	1,080	274	1,570	438	580	406	31	47
22	50		214	2,470	1,140	262	1,920	505	470	274	42	45
23	57		180	1,640	1,440	250	1,990	580	406	202	57	41
24	99	85	148	1,260	1,200	226	1,990	505	378	180	45	36
25	226		148	765	920	214	1,570	505	350	120	33	40
26	226		129	580	670	191	1,140	505	274	109	30	51
27	214		113	580	540	180	920	438	262	88	28	79
28	191		111	765	715	169	920	378	311	180	23	148
29	148		109	715	....	158	865	311	337	180	20	138
30	133		100	580	....	148	715	274	274	127	20	202
31	104	....	97	505	....	148	....	286	....	88	22	....

Daily discharge, in second-feet, of Meadow River near Russellville, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910-11.												
1	202	66	470	2,310	2,880	350	670	378	202	33	10	80
2	158	73	540	2,690	3,390	350	625	406	238	25	9.4	127
3	106	78	920	4,700	1,640	311	865	470	138	20	8.8	75
4	61	86	540	3,420	1,200	298	2,150	470	94	25	8.0	45
5	48	94	406	1,920	975	274	3,600	406	82	58	7.5	28
6	38	96	337	1,200	715	2,070	3,150	337	76	41	7.2	25
7	37	91	286	815	625	2,970	2,230	298	102	116	12	24
8	51	85	286	625	540	2,390	1,710	274	68	75	43	22
9	158	76	286	438	975	1,440	1,920	250	52	58	41	15
10	202	75	262	400	1,200	1,440	1,850	238	40	37	23	13
11	131	73	238	364	1,080	1,710	1,440	214	37	37	28	15
12	92	71	191	337	865	1,440	1,080	169	37	138	28	30
13	71	68	191	670	670	1,140	975	169	66	116	20	36
14	54	66	169	1,380	505	920	920	148	120	71	14	34
15	47	66	158	1,380	438	715	1,570	131	92	44	12	33
16	41	66	148	1,570	337	625	1,710	125	70	28	12	40
17	36	68	131	1,260	298	505	1,380	111	57	24	10	111
18	33	60	129	815	274	470	975	107	57	23	10	83
19	30	53	158	625	311	470	715	100	59	18	14	56
20	28	44	202	505	470	1,380	1,200	89	76	16	14	40
21	26	44	191	540	540	1,320	1,570	80	68	15	13	33
22	33	49	191	1,440	540	975	1,500	70	59	19	10	92
23	48	51	226	1,380	438	815	1,640	64	44	17	8.8	99
24	71	50	364	1,140	410	580	1,260	58	35	19	8.4	89
25	54	88	670	920	378	470	920	59	30	20	7.8	64
26	46	214	580	815	364	406	670	71	28	18	7.6	47
27	40	214	505	1,320	350	470	505	64	54	16	7.4	32
28	57	470	438	1,380	350	670	438	57	56	15	7.2	30
29	67	920	715	1,990	....	625	378	238	44	15	10	27
30	97	670	3,890	6,880	....	670	364	180	40	14	14	23
31	79	....	3,060	4,700	....	670	....	100	....	12	19	....
1911-12.												
1	22	115	438	920	1,200	975	1,640	1,260	104	262	100	169
2	33	99	378	920	975	715	1,850	920	91	148	85	158
3	80	86	337	765	670	505	2,550	765	79	111	68	118
4	180	76	274	625	580	378	2,070	580	68	148	48	91
5	158	70	262	600	540	364	1,320	438	60	250	44	88
6	158	107	250	580	438	324	920	438	51	324	38	82
7	109	1,440	202	540	406	298	670	815	46	350	33	71
8	191	1,260	180	470	378	298	505	920	38	298	30	59
9	214	865	191	406	311	715	670	815	36	169	28	44
10	180	670	180	337	238	920	540	625	32	226	27	37
11	250	470	180		226	865	470	505	23	202	26	33
12	378	337	191	215	214	975	378	3,060	20	119	25	30
13	298	406	202		214	2,230	350	3,150	18	158	23	29
14	238	438	202		202	2,150	324	2,390	16	109	23	21
15	378	438	191	214	180	4,590	298	1,440	14	169	22	16
16	470	378	226		180	6,040	350	2,880	14	158	21	16
17	378	324	262	225	180	3,330	406	4,810	13	158	19	16
18	2,710	540	364		191	1,850	540	2,880	21	364	17	17
19	1,710	865	350	1,420	238	1,380	625	1,440	47	262	23	18
20	1,030	670	337	870	337	1,200	540	920	89	118	50	17
21	670	505	286	650	1,380	1,500	470	580	102	80	148	16
22	406	406	286	505	1,800	1,500	406	406	62	68	324	16
23	378	350	406		2,230	1,320	540	337	43	52	262	27
24	406	350	865	360	1,380	1,920	580	286	35	44	191	158
25	337	470	920		975	2,630	505	238	28	148	109	262
26	274	470	1,030		1,500	2,230	438	214	50	438	71	238
27	226	438	1,440	215	3,690	1,380	540	180	107	298	53	180
28	191	470	1,440		2,310	1,030	1,200	148	865	202	46	158
29	169	580	1,080	214	1,440	2,550	1,030	148	625	133	104	138
30	148	505	815	1,640	....	3,240	1,320	138	438	118	214	118
31	124	....	765	1,500	....	2,390	....	118	....	107	180	....

Daily discharge, in second-feet, of Meadow River near Russellville, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13												
1	107	113	67	1,320	975	1,030	670	470	815	51	30	20
2	88	106	92	975	865	865	505	378	580	41	26	19
3	72	99	134	920	975	505	406	337	438	37	25	16
4	61	88	286	1,200	2,390	580	350	298	580	337	20	14
5	51	72	765	1,200	1,990	470	324	274	1,080	274	18	13
6	42	67	975	1,200	1,320	438	298	238	815	406	19	12
7	37	226	1,080	2,630	865	378	250	337	920	378	16	14
8	34	1,920	865	5,900	865	311	226	311	1,440	202	15	17
9	30	1,260	580	2,710	1,080	286	202	274	1,440	122	14	22
10	28	715	438	1,640	1,080	350	191	238	1,030	106	12	24
11	25	505	350	1,440	1,030	1,080	180	214	625	106	38	28
12	24	378	298	1,200	1,200	1,780	274	191	438	124	52	24
13	24	311	262	1,080	1,640	1,380	580	180	350	102	88	21
14	25	286	214	975	1,640	2,230	580	158	274	76	49	17
15	28	262	214	765	1,500	3,790	3,510	148	214	91	33	15
16	31	226	202	580	1,140	2,710	2,540	148	180	124	33	14
17	37	202	191	505	470	1,640	1,570	378	169	158	30	14
18	34	180	169	438	324	1,080	1,030	580	191	131	28	16
19	53	169	169	406	298	765	715	438	104	118	33	33
20	238	148	148	378	286	540	470	364	82	765	36	46
21	226	138	133	438	311	470	406	1,200	71	580	25	88
22	180	131	107	505	406	406	350	1,080	71	406	65	540
23	226	125	102	505	470	337	311	1,200	76	202	202	298
24	406	120	96	765	505	311	274	3,400	75	148	238	180
25	438	118	98	1,260	438	298	250	1,710	71	134	124	88
26	337	115	100	1,200	378	438	238	1,140	120	102	72	73
27	298	106	122	1,080	378	2,390	298	1,990	115	83	49	52
28	191	86	134	1,030	765	4,090	438	3,900	115	64	39	44
29	180	56	131	920	....	2,470	505	2,230	78	51	30	35
30	148	47	378	815	....	1,570	505	1,500	64	44	24	49
31	127	....	1,990	765	....	1,030	....	1,080	....	36	20	....
1913-14												
1	104	226	1,200	438	1,780	765	1,380	470	33	7.1	9.6	67
2	202	214	2,470	438	1,440	765	1,710	378	30	6.9	9.6	61
3	286	180	1,850	438	1,140	815	1,710	324	28	7.1	8.6	54
4	670	158	1,320	1,080	865	815	1,320	298	25	7.1	8.0	45
5	438	136	975	920	670	815	1,030	324	23	12	7.6	35
6	286	122	715	765	540	765	815	540	37	12	7.2	30
7	202	113	580	625	975	625	625	1,080	35	10	6.8	26
8	148	106	1,080	580	1,260	505	1,030	1,030	33	9.6	6.8	21
9	125	238	920	670	1,030	438	2,310	975	30	9.0	17	18
10	94	406	765	920	865	337	1,710	865	27	12	27	15
11	80	470	670	1,080	670	715	1,140	715	23	9.8	22	14
12	71	438	505	920	505	1,440	865	580	19	8.8	28	17
13	65	765	438		505	1,080	715	505	16	8.0	34	19
14	76	1,140	364		470	1,030	580	438	14	11	31	18
15	61	2,150	337	650	500	1,260	505	337	12	29	26	18
16	54	2,970	324		500	1,920	2,150	274	10	88	23	19
17	52	3,990	298		505	3,330	2,550	250	9.0	82	17	18
18	50	2,310	274	625	670	3,600	1,850	226	8.6	62	14	16
19	51	1,500	262	625	1,140	1,850	1,570	214	9.0	50	12	14
20	113	975	250	670	1,990	1,260	1,710	191	7.9	45	9.0	12
21	286	670	250	3,790	2,070	920	1,570	180	8.2	40	58	10
22	350	505	238	2,710	1,380	765	1,380	148	7.9	33	32	9.6
23	311	364	238	1,710	1,320	975	1,140	129	9.8	27	14	10
24	378	311	226	1,260	1,140	670	865	116	9.8	20	12	14
25	1,200	262	274	3,240	1,030	1,030	625	102	8.6	15	39	12
26	2,390	238	670	2,150	865	2,150	540	89	7.9	12	61	9.0
27	1,710	214	670	1,570	815	3,240	920	80	7.6	12	138	8.0
28	1,080	[illegible]	670	1,500	765	2,790	975	70	7.3	9.8	148	7.7
29	625	1,320	540	1,380	....	2,470	765	57	7.3	9.2	111	7.4
30	337	1,030	505	1,320	....	1,850	580	46	7.1	8.8	86	7.2
31	[illegible]	....	470	1,780	....	1,440	....	58	....	9.6	75	....

Daily discharge, in second-feet, of Meadow River near Russellville, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15												
1	7.0	37	57	1,080	1,640	580	214	1,570	274	21	19	25
2	6.8	37	180	865	6,040	505	214	1,140	324	37	22	22
3	6.6	34	406	670	6,880	406	202	920	337	56	27	20
4	6.5	33	625	505	3,790	350	202	815	324	73		25
5	6.8	31	1,850	378	2,150	337	202	975	274	66		337
6	7.5	30	2,310	364	1,710	324	202	865	226	59		337
7	7.4	28	1,780	6,760	1,500	364	202	765	191	52		298
8	7.2	27	1,030	5,580	1,320	378	202	540	238	56		214
9	7.1	25	765	2,470	1,080	364	226	438	202	202	18	134
10	7.4	24	765	1,440	865	350	226	406	158	180		97
11	8.4	23	765	1,140	765	470	226	364	120	148		51
12	8.4	22	715	1,030	580	505	286	337	113	118		40
13	8.8	20	650	920	470	470	311	311	116	83		34
14	11	20	580	670	406	438	311	298	109	64		30
15	20	23	540	865	1,320	438	286	262	540	49	42	24
16	43	25	350	865	1,990	470	274	238	470	64	35	23
17	138	61	238	2,150	1,570	505	262	226	406	57	25	22
18	169	102	169	3,890	1,320	505	250	202	324	61	48	21
19	148	92	214	5,580	1,030	470	250	180	250	56	46	20
20	102	75	505	4,490	765	470	238	158	191	66	42	23
21	72	66	975	2,070	540	505	214	148	148	125	37	40
22	60	58	1,380	1,260	378	406	202	122	109	109	31	80
23	51	52	1,140	1,030	337	350	191	109	80	68	26	102
24	45	49	865	765	350	311	324	106	70	54	22	70
25	41	48	715	765	670	274	438	99	58	46	22	53
26	41	47	505	670	1,080	262	438	99	49	43	20	49
27	58	45	505	580	865	274	406	106	41	39	18	72
28	71	44	438	540	625	274	815	99	35	35	17	133
29	54	41	406	580	....	250	2,390	92	29	30	17	120
30	46	41	1,320	670	....	226	1,990	180	24	26	18	99
31	39	....	1,500	1,160	....	214	....	214	....	22	28	....
1915-16												
1	1,780	50	311	1,500	1,780	865	1,380	438	580		238	78
2	3,150	48	298	1,440	1,990	670	1,180	406	540		670	70
3	1,780	46	274	1,080	1,710	580	975	378	540		1,320	67
4	1,260	44	262	765	1,380	505	670	406	580	125	1,200	60
5	625	42	250	670	1,140	505	505	438	540		1,920	56
6	470	40	226	580	975	1,140	438	406	540		1,640	49
7	365	39	202	670	815	3,690	378	378	540	60	1,260	45
8	214	38	180	715	670	3,330	378	324	540	57	1,140	45
9	148	37	158	670	865	2,550	378	274	540	54	2,470	62
10	120	35	148	625	975	1,640	438	226	580	79	1,990	70
11	102	35	136	1,500	920	1,200	1,380	202	580	75	1,640	61
12	92	33	134	2,970	920	975	2,880	169	540	274	1,440	58
13	85	39	125	2,880	865	715	3,060	158	470	262	1,200	56
14	72	42	122	2,390	865	580	2,470	148	438	238	975	59
15	61	286	118	1,380	815	815	1,320	148	580	226	865	298
16	56	540	120	1,030	715	975	920	138	1,140	250	625	286
17	54	540	505	815	625	815	765	148	1,260	765	2,150	262
18	51	540	3,330	1,200	580	715	670	148	1,140	715	1,380	238
19	58	815	2,710	920	540	625	470	138	1,030	580	1,080	169
20	125	975	1,440	840	540	540	378	136	865	470	920	109
21	113	865	1,200	765	540	505	324	124	715	438	580	78
22	94	670	975	952	540	975	311	113	580	865	438	61
23	80	540	715	1,140	625	1,320	298	214	409	1,380	815	59
24	75	470	540	975	1,030	1,200	262	670	324	1,200	580	56
25	71	406	505	765	3,330	975	350	670	298	580	378	53
26	67	378	865	625	3,150	815	580	580	438	378	262	47
27	64	350	765	505	2,230	865	625	540	324	324	214	39
28	58	337	765	438	1,570	2,630	625	505	262	378	158	39
29	54	324	2,550	406	1,030	2,710	580	470	214	350	131	54
30	53	311	4,920	1,030	....	2,310	505	540	148	311	109	49
31	51	....	2,880	1,030	....	1,780	....	670	....	286		....

NOTE.—Daily discharge estimated, because of ice or missing gage readings, from observer's notes, climatic data, or by comparison with flow at other stations as follows: Nov. 17-30, Dec. 26-31, 1909; Jan. 3, 11-12, Feb. 1-2, 6-7, Dec. 8, 1910; Jan. 10, Feb. 24, Dec. 5, 1911; Jan. 5, 11-14, 16-21, 23-28, Feb. 22, Dec. 25, 1912; Jan. 8, Feb. 8, 9, Apr. 16, May 24, 28, Aug. 11, 12, Sept. 28, Nov. 15-17, 1913; Jan. 13-17, Feb. 15-16, Mar. 2, Dec. 13-18, 26, 1914; Jan. 31, Apr. 1, Aug. 4-14, 1915; Jan. 9, 18-20, 22, Apr. 2, July 1-6, 1916. Braced figures show mean discharge for period.

Monthly discharge of Meadow River near Russellville, W. Va., for the years ending Sept. 30, 1908-1916.

[Drainage area, 297 square miles.]

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1908.					
July 19-31	765	133	275	0.926	0.45
August	470	44	121	.407	.47
September	47	11	20.2	.068	.08
1908-9.					
October	158	10	24.7	.083	.10
November	138	25	54.7	.184	.21
December	1,260	44	356	1.20	1.38
January	2,150	324	897	3.02	3.48
February	1,850	505	1,030	3.47	3.61
March	3,060	378	1,230	4.14	4.77
April	2,550	262	861	2.90	3.24
May	2,070	202	705	2.37	2.73
June	580	102	282	.949	1.06
July	975	44	231	.778	.90
August	505	16	77.7	.262	.30
September	250	12	62.3	.210	.23
The year	3,060	10	482	1.62	22.01
1909-10.					
October	226	16	86.1	.290	.33
November	364	47	111	.374	.42
December	815	67	226	.761	.88
January	2,470	106	1,210	4.07	4.69
February	2,630	406	944	3.18	3.31
March	2,150	148	547	1.84	2.12
April	1,990	125	757	2.55	2.84
May	1,140	238	475	1.60	1.84
June	3,510	226	1,100	3.70	4.13
July	540	88	239	.805	.93
August	79	20	39.8	.134	.15
September	350	29	123	.414	.46
The year	3,510	16	484	1.63	22.10
1910-11.					
October	202	26	72.3	.243	.28
November	920	44	141	.475	.53
December	3,890	129	544	1.83	2.11
January	6,880	337	1,640	5.52	6.36
February	2,880	274	777	2.62	2.73
March	2,970	274	934	3.14	3.62
April	3,600	364	1,330	4.48	5.00
May	470	57	191	.643	.74
June	238	28	74.0	.249	.28
July	138	12	38.2	.129	.15
August	43	7.2	14.4	.048	.06
September	127	13	48.9	.165	.18
The year	6,880	7.2	483	1.63	22.04
1911-12.					
October	2,710	22	403	1.36	1.57
November	1,440	70	473	1.59	1.77
December	1,440	180	469	1.58	1.82
January	1,640	....	530	1.78	2.05
February	3,690	180	848	2.86	3.08
March	6,040	298	1,670	5.62	6.48
April	2,550	298	802	2.70	3.01
May	4,810	118	1,090	3.67	4.23
June	865	13	108	.364	.41
July	438	44	189	.636	.73
August	224	17	79.1	.266	.31
September	262	16	81.4	.274	.31
The year	6,040	13	563	1.90	25.77

Monthly discharge of Meadow River near Russellville, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1912-13					
October	438	24	123	0.414	0.48
November	1,920	47	279	.939	1.05
December	1,990	67	351	1.18	1.36
January	5,900	378	1,190	4.01	4.62
February	2,390	286	914	3.08	3.21
March	4,090	286	1,160	3.91	4.51
April	3,510	180	615	2.07	2.31
May	3,900	148	851	2.87	3.31
June	1,440	64	421	1.42	1.58
July	765	36	181	.609	.70
August	238	12	48.5	.163	.19
September	540	12	61.5	.207	.23
The year	5,900	12	515	1.73	23.55
1913-14					
October	2,390	50	392	1.32	1.52
November	3,990	106	794	2.67	2.98
December	2,470	226	656	2.21	2.55
January	3,790	438	1,180	3.97	4.58
February	2,070	470	979	3.30	3.44
March	3,600	337	1,370	4.61	5.32
April	2,550	505	1,220	4.11	4.59
May	1,080	38	357	1.20	1.38
June	37	7.1	17.0	.057	.06
July	88	6.9	22.0	.074	.09
August	148	6.8	35.4	.119	.14
September	67	7.2	21.1	.071	.08
The year	3,990	6.8	584	1.97	26.73
1914-15.					
October	169	6.5	42.1	.142	.16
November	102	20	42.0	.141	.16
December	2,310	57	782	2.63	3.03
January	6,760	364	1,670	5.62	6.48
February	6,880	337	1,500	5.05	5.26
March	580	214	389	1.31	1.51
April	2,390	191	406	1.37	1.53
May	1,570	92	399	1.34	1.54
June	540	24	194	.653	.73
July	202	21	69.8	.235	.27
August	48	17	24.5	.082	.09
September	337	20	87.2	.294	.33
The year	6,880	6.5	462	1.56	21.09
1915-16.					
October	3,150	51	369	1.24	1.43
November	975	33	297	1.00	1.12
December	4,920	118	894	3.01	3.47
January	2,970	406	1,070	3.60	4.15
February	3,330	540	1,160	3.91	4.22
March	3,690	505	1,270	4.28	4.93
April	3,060	262	850	2.86	3.19
May	670	113	332	1.12	1.29
June	1,260	148	576	1.94	2.16
July	1,380	54	366	1.23	1.42
August	2,470	89	964	3.25	3.75
September	298	39	91.1	.307	.34
The year	4,920	33	688	2.32	31.47

Meadow River at Nallen, W. Va.[19]

Location.—Chain gage on highway bridge at Nallen, Fayette County.
Drainage area.—297 square miles.
Records available.—July, 1908, to September, 1916; November, 1928, to September, 1929.
Extremes.—Maximum discharge during year, 5,140 second-feet Feb. 28 (gage height, 12.03 feet); minimum, 8 second-feet Sept. 7 (gage height, 2.95 feet).

1908-1916, 1928-29: Maximum discharge, about 7,300 second-feet Feb. 3, 1915 (gage height, 13.25 feet); minimum, 6.7 second-feet Aug. 7 and 8, 1914 (gage height, 2.57 feet).

Remarks.—Records good. Discharge estimated because of ice Jan. 30 to Feb. 2 and because of missing record Sept. 8.

Daily and monthly discharge, in second-feet, 1928-29.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	....	3,880	264	650	4,690	490	1,060	2,620	250	43	18
2	....	2,780	340	600	3,180	430	1,010	1,300	785	36	14
3	....	1,520	830	570	1,770	392	1,580	875	875	32	12
4	....	1,060	1,150	570	1,520	340	1,840	695	570	124	12
5	....	785	875	510	3,340	830	1,520	610	392	179	11
6	....	570	1,010	570	4,600	875	1,200	430	264	104	9.6
7	....	450	1,200	740	3,520	740	1,010	308	200	73	8.4
8	....	340	1,580	695	2,220	650	920	237	159	54	8.9
9	....	250	1,770	650	1,520	490	785	237	105	39	430
10	....	224	1,350	650	920	410	650	278	100	29	340
11	....	200	785	570	695	340	510	224	90	27	324
12	....	190	650	450	570	308	410	169	124	31	169
13	....	179	530	375	510	250	358	150	212	31	108
14	....	190	740	293	965	224	1,250	169	179	29	75
15	....	740	830	212	1,580	200	1,400	237	159	26	62
16	....	1,100	610	179	1,350	250	1,200	490	132	20	45
17	....	1,150	392	179	1,010	610	1,150	392	108	17	37
18	....	1,150	324	179	875	875	965	278	87	15	35
19	....	1,200	830	224	740	920	1,520	212	72	14	33
20	....	965	470	340	650	920	2,220	159	57	12	32
21	....	830	875	430	570	875	3,020	132	46	10	29
22	....	695	1,010	490	490	1,060	2,140	102	36	9.2	24
23	....	610	1,200	430	1,100	1,100	1,350	83	31	41	21
24	570	470	1,300	430	2,540	920	965	124	26	410	18
25	490	375	1,300	392	2,060	785	875	450	24	237	16
26	410	293	1,640	1,250	1,400	785	740	830	29	116	14
27	490	264	1,520	3,180	1,100	740	650	430	60	70	12
28	358	224	1,150	4,780	830	785	450	278	76	47	12
29	324	212	875	....	650	1,300	875	324	87	37	11
30	1,640	237	800	....	530	1,250	1,250	308	69	28	11
31	....	190	700	....	510	....	2,540	....	48	24	....

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
November 24-30	1,640	324	612	2.06	0.54
December	3,880	179	752	2.53	2.92
January	1,770	264	932	3.14	3.62
February	4,780	179	735	2.47	2.57
March	4,690	490	1,550	5.22	6.02
April	1,300	200	671	2.26	2.52
May	3,020	358	1,210	4.07	4.69
June	2,620	83	438	1.47	1.64
July	875	24	176	.593	.68
August	410	9.2	63.4	.213	.25
September	430	8.4	65.0	.219	.24

[19] Formerly published as "near Russellville."

Meadow River at Nallen, W. Va.

Location.—Chain gage on highway bridge at Nallen, Fayette County.
Drainage area.—297 square miles.
Records available.—July, 1908, to September, 1916; November, 1928, to September, 1930.
Extremes.—Maximum discharge during year, 6,140 second-feet Oct. 2 (gage height, 13.05 feet); practically no flow Sept. 23-24, 28-30.
1908-1916, 1928-1930: Maximum discharge, about 7,300 second-feet Feb. 3, 1915 (gage height, 13.25 feet); practically no flow Sept. 23-24, 28-30, 1930.

Remarks.—Records good except those above 4,000 second-feet and those estimated because of ice, Nov. 30, Dec. 1-5, 24-27, Jan. 18 to Feb. 2, which are fair.

Daily and monthly discharge, in second-feet, 1929-30.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	1,460	310	965	130	570	308	108	69	0.7	0.6	0.4
2	2,300	1,400	280	875	130	470	293	108	58	1.4	.6	.4
3	4,690	3,610	250	1,010	169	375	392	116	49	1.5	.5	.3
4	2,780	3,700	200	1,010	264	324	1,200	104	41	1.4	.4	.3
5	1,770	2,460	170	875	2,380	293	1,060	95	34	1.1	.4	.3
6	965	1,460	250	695	1,980	410	875	108	30	.9	.4	.2
7	650	965	308	610	1,400	1,250	920	159	35	.7	.4	.2
8	392	695	430	530	1,060	4,600	1,060	132	33	.5	.4	.2
9	264	510	830	490	830	3,180	1,010	124	37	.4	.4	.2
10	190	375	740	430	650	2,060	920	102	35	.4	.3	.1
11	150	324	650	392	530	1,400	740	91	29	.4	.3	.1
12	124	308	570	340	450	1,250	570	86	25	.4	.3	.1
13	100	278	490	293	450	1,100	470	73	21	.4	.3	.1
14	94	278	430	293	530	1,010	375	100	19	8.4	.3	.1
15	88	358	392	293	510	965	340	132	16	10	.5	.1
16	83	570	375	278	570	785	308	159	13	9.2	.5	.1
17	78	1,060	340	250	510	650	264	150	12	8.4	.5	.1
18	73	5,540	340	210	410	530	250	179	15	7.6	.5	.1
19	64	4,420	570	180	450	695	237	570	14	6.0	.4	.1
20	61	2,780	1,350	140	430	785	224	830	13	4.0	.4	.1
21	57	1,400	1,150	160	490	740	224	695	11	2.8	.4	.1
22	1,770	920	920	180	490	610	250	490	8.8	.7	1.0	.1
23	3,430	695	740	180	530	530	200	375	7.6	6.0	2.0	0
24	2,380	510	600	160	695	430	179	308	6.8	4.3	2.5	0
25	1,840	410	500	140	1,060	375	159	212	6.0	2.8	1.5	.1
26	830	340	450	130	1,010	392	141	159	5.3	1.5	1.2	.1
27	610	324	400	125	830	358	132	141	4.0	3.4	1.7	.1
28	410	358	650	160	570	358	124	124	3.4	4.6	1.0	0
29	340	430	1,400	160	....	358	116	104	.7	3.7	.7	0
30	650	360	1,250	150	....	358	108	91	.7	1.7	.5	0
31	1,460	....	1,100	150	....	340	....	80	....	1.0	.4	....

Month	Discharge in second-feet				
	Maximum	Minimum	Mean	Per square mile	Run-off in inches
October	4,690	11	926	3.12	3.60
November	5,540	278	1,280	4.31	4.81
December	1,400	170	595	2.00	2.31
January	1,010	125	382	1.29	1.49
February	2,380	130	697	2.35	2.45
March	4,600	293	889	2.99	3.45
April	1,200	108	448	1.51	1.68
May	830	73	203	.684	.79
June	69	.7	21.7	.073	.08
July	10	.4	3.11	.010	.01
August	2.5	.3	.69	.0023	.003
September	.4	0	.14	.00047	.0005
The year	5,540	0	452	1.52	20.67

Meadow River at Nallen, W. Va.

Location.—Chain gage at highway bridge at Nallen, Fayette County.
Drainage area.—297 square miles.
Records available.—July, 1908, to September, 1916; November, 1928, to September, 1931.
Extremes.—Maximum discharge during year, 3,970 second-feet Apr. 4 (gage height, 10.70 feet); no flow Oct. 1-23, Oct. 27 to Nov. 5.

1908-1916, 1928-1931: Maximum discharge, about 7,300 second-feet Feb. 3, 1915 (gage height 13.25 feet); practically no flow at times in 1930.
Remarks:—Records good.

Daily and monthly discharge, in second-feet, 1930-31.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0	0	4.6	69	308	237	1,350	375	340	35	179	190
2	0	0	4.6	40	237	530	1,460	324	340	29	141	150
3	0	0	6.4	45	179	610	1,200	278	278	50	2,940	190
4	0	0	25	40	150	510	3,610	250	212	88	1,980	200
5	0	0	26	56	108	410	3,520	212	308	70	1,840	159
6	0	.1	23	1,300	100	324	2,700	190	392	83	1,460	116
7	0	.1	54	1,100	124	293	1,910	179	375	132	1,010	94
8	0	.1	141	740	132	392	1,580	1,060	450	124	570	66
9	0	.1	100	530	324	550	1,910	1,350	470	169	375	54
10	0	.2	61	375	1,250	400	1,840	1,100	430	159	200	48
11	0	.2	45	212	965	350	2,140	875	324	179	212	44
12	0	.2	40	190	650	320	1,910	650	237	159	200	73
13	0	.2	35	159	510	300	1,350	740	190	73	530	37
14	0	.2	40	124	510	570	1,010	1,100	179	49	410	33
15	0	.2	37	108	650	1,770	785	1,150	490	34	308	33
16	0	.2	30	88	610	1,910	570	875	1,200	23	212	70
17	0	.3	24	88	650	965	430	695	610	33	132	150
18	0	.4	23	100	920	1,150	358	570	570	37	108	169
19	0	.4	21	141	1,200	1,010	308	610	324	32	88	108
20	0	.3	17	324	1,060	965	250	1,060	224	66	250	132
21	0	.3	15	358	830	830	212	1,640	179	52	1,520	610
22	0	.3	16	308	650	830	212	1,770	141	48	1,400	430
23	0	.3	18	224	490	785	570	3,180	124	78	2,380	278
24	.1	.4	13	141	392	965	740	2,300	179	250	1,640	324
25	.1	.4	12	100	358	1,150	740	1,520	132	430	1,150	308
26	.1	.5	12	150	308	1,100	695	1,150	100	308	785	470
27	0	.6	24	293	250	1,010	740	875	79	190	530	1,520
28	0	.7	94	650	224	1,150	695	650	63	150	375	1,400
29	0	.9	159	610	....	2,700	570	430	54	88	308	830
30	0	1.4	104	490	....	2,300	470	358	47	72	278	610
31	0	....	83	392	....	1,580	....	358	....	66	237	....

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	0.1	0	0.01	0.000034	0.00004
November	1.4	0	.30	.0010	.001
December	159	4.6	42.2	.142	.16
January	1,300	40	308	1.04	1.20
February	1,250	100	505	1.70	1.77
March	2,700	237	902	3.04	3.50
April	3,610	212	1,190	4.01	4.47
May	3,180	179	899	3.03	3.49
June	1,200	47	301	1.01	1.13
July	430	23	108	.364	.42
August	2,940	88	766	2.58	2.97
September	1,520	33	297	1.00	1.12
The year	3,610	0	443	1.49	20.23

Meadow River at Nallen, W. Va.

Location.—Chain gage at highway bridge at Nallen, Fayette County.
Drainage area.—297 square miles.
Records available.—July, 1908, to September, 1916; November, 1928 to September, 1932.
Extremes.—Maximum discharge during year, 7,840 second-feet June 28 (gage height, 14.68 feet); minimum discharge, 0.4 second-foot Sept. 18, 19; minimum gage height, 2.58 feet Sept. 19.

1908-16, 1928-32: Maximum discharge, that of June 28, 1932; minimum discharge, less than 0.1 second-foot at times in 1930.
Remarks.—Records good. Discharge interpolated June 5.

Discharge, in second-feet, 1931-32.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	324	100	920	570	2,140	392	2,140	2,780	107	1,400	56	9.2
2	212	102	1,100	1,520	1,770	358	1,640	2,780	93	830	63	7.6
3	179	124	470	1,400	1,580	324	1,300	2,060	84	450	116	4.9
4	150	124	358	1,350	4,240	785	965	1,150	62	358	107	3.1
5	124	116	324	1,010	4,780	1,580	740	875	70	1,010	88	1.5
6	105	104	293	920	3,340	1,640	490	650	79	1,910	69	4.6
7	91	93	264	1,400	1,700	1,580	470	530	132	1,640	53	7.2
8	80	87	224	1,460	1,200	1,580	392	392	107	1,060	67	8.8
9	69	79	570	1,460	1,010	1,300	324	308	63	785	43	6.8
10	66	74	470	1,250	875	1,060	324	293	35	695	36	4.6
11	58	67	650	1,150	785	1,100	375	830	41	610	32	4.9
12	56	62	1,100	920	1,060	695	570	1,520	70	450	33	8.0
13	52	58	1,770	695	1,580	470	740	1,770	116	308	32	4.9
14	52	62	2,540	530	1,250	450	695	1,350	159	278	63	3.7
15	63	61	2,540	410	1,010	340	530	695	212	250	47	3.1
16	83	52	1,700	375	785	324	450	570	392	324	33	1.4
17	78	48	1,150	324	830	1,640	358	470	264	570	22	.6
18	68	52	785	308	920	3,430	324	392	141	392	31	.4
19	54	48	570	293	920	2,380	278	340	116	237	570	.4
20	47	48	510	293	830	1,460	250	293	124	141	278	1.0
21	43	46	610	278	650	1,200	224	237	278	124	169	1.0
22	41	44	830	264	610	1,060	293	785	392	141	100	.6
23	35	42	1,350	264	610	1,200	358	740	264	212	62	1.1
24	33	39	1,300	278	570	1,150	375	650	159	237	46	4.6
25	37	34	1,250	308	570	965	965	490	108	179	36	8.8
26	33	33	1,060	308	490	740	1,580	324	75	132	29	7.2
27	32	43	920	490	410	610	1,350	237	83	100	16	9.6
28	37	72	785	650	450	3,700	1,010	212	5,240	83	12	11
29	56	101	650	695	430	3,610	785	159	5,640	76	14	11
30	73	200	530	3,340	....	2,860	650	132	2,860	69	10	10
31	100	....	490	2,940	....	2,300	....	116	....	63	10	....

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	324	32	81.7	0.275	0.32
November	200	33	73.8	.248	.28
December	2,540	224	906	3.05	3.52
January	3,340	264	886	2.98	3.44
February	4,780	410	1,290	4.34	4.68
March	3,700	324	1,360	4.58	5.28
April	2,140	224	698	2.35	2.62
May	2,780	116	778	2.62	3.02
June	5,640	35	586	1.97	2.20
July	1,910	63	488	1.64	1.89
August	570	10	75.6	.255	.29
September	11	.4	5.05	.017	.02
The year	5,640	.4	602	2.03	27.56

Meadow River at Nallen, W. Va.

Location.—Chain gage at highway bridge at Nallen, Fayette County.

Drainage area.—297 square miles.

Records available.—July, 1908, to September, 1916; November, 1928 to September, 1933.

Discharge.—Maximum during the year, 3,970 second-feet Mar. 20 (gage height, 10.67 feet); minimum, 6.4 second-feet Oct. 3 (gage height, 2.90 feet).

1908-16, 1928-33: Maximum, about 7,840 second-feet June 28, 1932 (gage height, 14.68 feet); practically no flow at times in 1930.

Remarks.—Records good. Discharge estimated Apr. 3-10.

Discharge, in second-feet, 1932-33.

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.8	278	141	1,150	920	740	490	108	490	169	510	95
2	7.2	785	141	1,150	1,250	570	610	159	340	132	430	74
3	6.4	610	132	875	965	470	1,000	450	264	308	740	67
4	6.8	470	124	740	920	375	1,240	785	212	570	1,350	81
5	11	358	116	610	875	308	880	1,350	169	324	1,200	169
6	15	264	108	490	785	264	700	1,910	124	200	1,060	169
7	20	212	108	410	785	264	640	1,640	116	141	830	124
8	26	179	105	340	2,700	570	780	1,350	159	102	308	94
9	29	324	97	510	3,100	920	1,120	1,400	250	80	237	74
10	34	1,980	93	875	1,640	920	920	1,910	308	68	190	61
11	31	1,400	94	875	1,150	830	610	2,060	224	159	237	49
12	24	1,200	116	830	875	920	695	1,770	169	124	212	44
13	14	875	293	785	740	740	920	1,520	141	132	169	42
14	12	570	430	570	740	1,010	1,150	1,300	93	86	141	49
15	9.2	392	490	510	1,100	3,340	965	1,250	74	61	116	224
16	11	278	695	450	1,700	2,540	920	1,520	62	54	116	570
17	94	278	695	340	1,400	1,770	830	1,640	56	46	150	358
18	695	264	740	324	1,250	1,640	740	1,350	49	39	169	250
19	610	264	650	392	1,060	3,340	650	1,200	41	33	169	141
20	740	1,400	510	1,100	2,380	3,610	610	1,100	30	28	124	124
21	550	1,200	358	2,380	2,860	3,700	530	920	24	22	108	116
22	375	1,055	250	3,610	2,060	3,020	450	650	21	22	88	102
23	250	785	340	2,860	1,400	1,980	375	530	18	45	81	78
24	124	570	570	1,770	1,010	1,520	324	470	13	32	86	64
25	94	392	740	1,300	830	1,150	308	392	21	35	87	54
26	76	308	875	1,520	920	695	264	410	42	116	83	43
27	64	250	875	1,700	1,060	570	237	510	278	650	64	36
28	212	212	1,640	1,640	875	570	212	490	278	1,300	53	43
29	278	200	2,220	1,350	....	530	200	470	237	1,770	64	46
30	237	190	1,910	1,060	....	510	190	510	200	1,300	159	43
31	190	....	1,460	920	....	470	....	570	....	965	150	....

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	740	6.4	160	0.538	0.62
November	1,980	179	585	1.97	2.20
December	2,220	93	552	1.86	2.14
January	3,610	324	1,080	3.64	4.20
February	3,100	740	1,330	4.48	4.66
March	3,700	264	1,290	4.34	5.00
April	1,240	190	652	2.20	2.46
May	2,060	108	1,020	3.43	3.95
June	490	13	150	.505	.56
July	1,770	22	294	.989	1.14
August	1,350	53	306	1.03	1.19
September	570	36	116	.390	.44
The year	3,700	6.4[1]	625	2.10	28.56

Meadow River at Nallen, W. Va.

Location.—Chain gage at highway bridge at Nallen, Fayette County, a quarter of a mile below Youngs Creek.

Drainage area.—297 square miles.

Records available.—July, 1908, to September, 1916; November, 1928, to September, 1934.

Extremes.—Maximum discharge recorded during year, 8,740 second-feet Mar. 5 (gage height, 15.64 feet); minimum, 3.2 second-feet July 25 (gage height, 2.57 feet).
1908-16, 1928-34: Maximum discharge recorded, that of Mar. 5, 1934; practically no flow at times in 1930.

Remarks.—Records good.

Discharge, in second-feet, 1933-34.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	33	24	108	610	212	264	890	212	53	11	30	14
2	30	23	101	1,250	237	293	585	190	51	9.8	34	12
3	24	21	104	1,100	212	3,260	472	159	85	9.3	48	9.8
4	17	19	108	875	190	5,740	403	150	73	7.8	264	9.0
5	15	17	116	695	169	8,540	354	141	67	6.7	179	8.6
6	14	86	650	695	169	6,840	323	132	56	6.0	90	8.1
7	13	79	965	920	169	4,870	293	124	46	4.7	64	7.6
8	12	84	785	1,400	150	3,340	308	116	100	4.0	48	7.1
9	12	83	740	1,200	141	3,100	293	124	68	6.4	34	6.4
10	10	76	650	965	132	2,140	293	132	60	7.8	28	5.8
11	8.8	72	570	740	132	1,460	278	141	49	9.0	25	5.1
12	13	62	490	530	141	990	250	150	44	9.8	22	7.4
13	13	73	264	430	141	840	237	159	42	12	19	8.3
14	12	86	212	410	159	665	200	150	35	15	16	8.6
15	11	93	200	358	141	625	224	200	27	14	15	9.8
16	16	107	237	308	141	386	338	370	21	12	46	11
17	53	116	410	278	169	508	386	403	17	9.8	88	33
18	101	116	570	224	190	490	437	354	16	8.1	108	73
19	95	116	610	212	224	472	750	278	20	6.7	82	48
20	79	124	3,430	200	250	545	890	212	42	6.0	48	31
21	53	150	2,380	179	224	508	990	169	64	5.3	36	24
22	40	179	1,400	169	190	454	940	150	40	4.8	27	19
23	36	212	1,100	169	179	420	890	124	32	4.5	24	16
24	33	224	740	159	169	370	750	116	26	3.9	22	14
25	33	224	570	159	179	338	585	108	22	4.3	27	12
26	29	212	470	150	224	370	545	101	20	6.2	27	12
27	26	190	410	159	250	1,340	437	88	17	12	24	14
28	22	169	324	169	278	2,060	278	73	11	53	22	15
29	19	150	308	124	....	1,910	250	68	10	64	20	19
30	19	116	264	58	....	1,520	237	61	9.8	58	18	124
31	22	....	264	212	....	1,190	....	55	....	36	16	....

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
October	101	8.8	29.5	0.099	0.11
November	224	17	110	.370	.41
December	3,430	101	631	2.12	2.44
January	1,400	58	487	1.64	1.89
February	278	132	184	.620	.65
March	8,540	264	1,802	6.07	7.00
April	990	200	470	1.58	1.76
May	403	55	162	.545	.63
June	100	9.8	40.8	.137	.15
July	64	3.9	13.8	.046	.05
August	264	15	50.0	.168	.19
September	124	5.1	19.8	.067	.07
The year	8,540	3.9	336	1.13	15.35

Meadow River at Nallen, W. Va.

Location.—Chain gage, lat. 38°6'45", long. 80°52'35", at highway bridge at Nallen, Fayette County.

Drainage area.—287 square miles (revised).

Records available.—July, 1908, to September, 1916; November, 1928, to September, 1935.

Extremes.—Maximum discharge observed during year, about 5,940 second-feet Apr. 1 (gage height, 12.84 feet); minimum, 16 second-feet Sept. 30 (gage height, 2.99 feet.)

1908-16, 1928-35: Maximum discharge observed, about 8,740 second-feet Mar. 5, 1934, (gage height, 15.64 feet); practically no flow at times in 1930.

Remarks.—Records good.

Rating tables, water year 1934-35 (gage height, in feet, and discharge, in second-feet)

Table for Oct. 1 to Mar. 12				Table for Mar. 13 to Sept. 30			
3.1	19	5.0	338	3.0	16	5.0	365
3.2	24	6.0	705	3.2	29	6.0	780
3.4	39	7.0	1,190	3.4	46	7.0	1,225
3.6	58	8.0	1,770	3.6	67	8.0	1,770
3.8	81	9.0	2,540	3.8	91	9.0	2,540
4.0	108	11.0	4,240	4.0	120	11.0	4,240
4.5	200			4.5	216	13.0	6,140

Discharge, in second-feet, water year October, 1934, to September, 1935

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	370	58	2,060	420	490	940	5,540	194	547	330	128	26
2	212	169	1,910	585	437	750	5,140	184	402	330	128	26
3	132	169	1,400	545	370	585	3,020	298	314	314	120	38
4	97	141	1,090	545	323	472	1,840	610	912	298	87	55
5	70	200	840	403	278	403	1,420	610	1,770	736	71	267
6	74	420	665	354	250	472	1,270	780	1,140	824	59	956
7	293	585	508	293	200	472	1,420	3,700	736	868	384	780
8	264	437	403	264	190	437	1,470	4,240	505	1,090	2,700	547
9	200	264	308	386	212	386	1,420	2,140	484	1,040	1,840	384
10	141	224	264	1,040	940	323	1,270	1,320	443	912	1,140	228
11	100	169	237	990	1,190	1,040	1,090	912	330	526	736	173
12	79	150	200	840	990	4,060	1,040	694	240	282	384	128
13	62	132	190	665	795	3,790	1,180	568	267	173	228	103
14	50	116	169	490	705	2,620	1,370	652	205	128	956	90
15	43	105	150	386	1,240	1,640	1,270	912	194	173	824	73
16	36	94	124	323	1,240	1,270	1,140	1,000	228	205	402	63
17	33	82	124	1,840	1,140	1,090	868	1,140	194	128	254	52
18	30	79	132	2,220	940	868	780	1,090	194	95	173	42
19	26	76	159	1,700	705	736	736	956	184	66	128	40
20	24	71	338	1,340	545	1,220	652	736	194	57	99	35
21	24	67	472	1,520	437	1,370	568	868	154	69	92	36
22	23	65	472	2,460	386	1,320	484	1,040	205	101	87	32
23	22	169	386	4,060	403	2,460	402	1,000	205	145	79	29
24	21	990	308	3,610	625	4,330	348	1,140	205	145	66	28
25	21	705	278	2,140	625	3,790	282	1,840	136	240	57	26
26	24	508	338	1,290	840	3,790	254	1,520	104	610	46	23
27	24	403	1,140	840	1,290	2,620	216	1,140	89	547	42	20
28	23	278	990	790	1,090	1,640	205	824	79	422	40	17
29	22	625	795	730	....	1,420	194	610	72	267	37	17
30	24	1,460	665	680	....	1,180	194	694	72	164	35	16
31	23	....	490	625	....	3,020	....	736	....	128	32	....

Month	Second-foot-days	Maximum	Minimum	Mean	Per square mile	Run-off in inches
October	2,587	370	21	83.5	0.291	0.34
November	9,011	1,460	65	300	1.05	1.17
December	17,605	2,060	124	568	1.98	2.28
Calendar year 1934	128,231.3	8,740	3.9	351	1.22	16.18
January	34,374	4,060	264	1,109	3.86	4.45
February	18,876	1,290	190	674	2.35	2.45
March	50,514	4,330	323	1,629	5.68	6.55
April	37,083	5,540	194	1,236	4.31	4.81
May	34,148	4,240	184	1,102	3.84	4.43
June	10,804	1,770	72	360	1.25	1.40
July	11,413	1,090	57	368	1.28	1.48
August	11,454	2,700	32	369	1.29	1.49
September	4,350	956	16	145	.505	.56
Water year 1934-35	242,219	5,540	16	664	2.31	31.41

Cherry River.—The tributaries of Cherry River, Laurel Creek, Little Laurel Creek, South Fork of Cherry River and North Fork of Cherry River, drain northern Greenbrier County. A gaging station on this river was established at Richwood, Nicholas County, July 3, 1908, and records are available from that date to September 30, 1916, when the station was discontinued. Another gaging station was established on this river at Fenwick, Nicholas County, September, 1929, and records are available for this station to September, 1935. The following records of these stations were taken from the various Water-Supply Papers of the United States Geological Survey previously quoted under the description of Greenbrier River:

Cherry River at Richwood, W. Va.

Location.—At highway bridge at Richwood, Nicholas County, half a mile below junction of North and South Forks.

Drainage area.—90 square miles.

Records available.—July 3, 1908, to September 30, 1916, when station was discontinued.

Gage.—Chain gage on bridge; read by Floyd Artrip.

Discharge measurements.—Made from bridge or by wading.

Channel and control.—Channel straight above and below gage. Right bank subject to overflow and water passes around station at extremely high stages. Bed composed of gravel and boulders. Control practically permanent. The removal of stones from the control in 1909 and 1911 for building purposes changed the stage-discharge relation.

Ice.—Stage-discharge relation affected by ice for short periods in severe winters.

Extreme of discharge.—1908-1916: Maximum stage recorded, 9.0 feet October 1, 1915 (discharge, about 6,600 second-feet); minimum stage recorded, 1.66 feet July 1, 1914 (discharge, 5.2 second-feet); minimum discharge recorded, 4.8 second-feet October 8, 9, 1908 (gage height, 2.12 feet; before change in control).

Accuracy.—Stage-discharge relation practically permanent. Removal of stones for building purposes from primary control in July and August, 1909, and May to August, 1911, changed stage-discharge relation. Date of changes in stage-discharge relation not definitely known but are assumed to have occurred August 15, 1909, and June 30, 1911. Rating curve used July 3, 1908, to August 15, 1909, and curve used August 16, 1909, to June 30, 1911, are both based on only a few measurements and the form of all the rating curves; they are considered only fairly well defined. Rating curve used July 1, 1911, to September 30, 1916, is well defined to 2,400 second-feet and is an extension above that point. Gage read twice daily to half-tenths. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in foot-note to table of daily discharge. Records fair, July 3, 1908, to August, 1911, except for July and August, 1909, and May to August, 1911, which are probably poor. Beginning with September, 1911, records good.

Discharge measurements of Cherry River at Richwood, W. Va., during the years 1908-1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1908.		Feet.	Sec.-ft.	1912.		Feet.	Sec.-ft.
July 2	Wm. M. O'Neill	2.54	54	Mar. 20	C. T. Bailey	4.35	1,270
28	W. G. Hoyt	4.24	970				
Sept. 26	Wm. M. O'Neill	2.25	8	1913.			
				Dec. 2	Peterson and Walters	3.89	916
1909.				2	do	3.85	894
Mar. 28	H. J. Jackson	4.04	744				
29	do	3.69	509	1914.			
Nov. 13	A. H. Horton	3.00	225	Nov. 22	J. G. Mathers	2.29	65.6
				22	do	2.27	63.5
1910.							
Mar. 12	do	2.67	138	1916.			
Aug. 16	J. C. Dort	2.27	41.4	Sept. 5	B. E. Jones	1.84	13.6
				5	do	1.84	13.7
1911.							
Oct. 25	Bailey and Perwien	2.74	205				

Daily discharge, in second-feet, of Cherry River at Richwood, W. Va., for the years ending Sept. 30, 1908-1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	58	120	46	11	120	80	15	21	109	37	6.0
2	54	106	46	12	92	85	15	22	308	37	12
3	46	92	28	13	98	87	15	23	356	37	15
4	57	80	28	14	57	92	15	24	525	28	15
5	184	92	37	15	57	68	12	25	419	80	8.0
6	436	150	37	16	80	68	8.0	26	273	264	9.4
7	299	120	28	17	73	46	8.0	27	1,390	120	8.7
8	222	92	22	18	123	57	8.0	28	970	92	9.4
9	192	382	15	19	177	46	8.0	29	465	68	18
10	150	263	15	20	120	46	8.0	30	286	57	18
								31	203	46	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908-9.												
1..........	15	120	42	308		327	226	525	109	308	28	20
2..........	12	100	32	222		408	308	465	106	590	32	20
3..........	8.7	82	28	184		625	286	337	98	299	22	16
4..........	8.0	46	35	150		625	251	273	132	203	15	16
5..........	8.0	39	32	1,140		558	436	230	132	138	14	210
6..........	8.0	35	30	970		525	525	184	214	408	12	75
7..........	8.0	30	39	890	340	525	387	157	123	465	22	39
8..........	4.8	28	286	890		495	290	308	103	286	14	32
9..........	4.8	25	264	300		660	247	203	126	203	9.4	35
10..........	6.8	24	243	268		810	199	590	247	157	8.0	142
11..........	92	25	222	235		1,220	170	558	299	114	8.0	173
12..........	37	46	203	286			157	372	214	92	6.0	91
13..........	23	30	184	222	377		203	281	170	126	6.0	60
14..........	15	20	167	184	495		1,740	222	150	126	6.0	46
15..........	14	15	144	590	850		735	181	222	87	106	43
16..........	12	22	132	890	1,220		366	150	188	68	223	39
17..........	11	22	222	590	590		286	126	170	64	123	75
18..........	11	27	735	525	436		230	103	356	55	91	55
19..........	10	55	660	525	495		192	82	211	46	82	46
20..........	9.4	82	525	408	772	480	184	78	153	32	64	39
21..........	9.4	82	398	380	495		256	150	123	28	50	32
22..........	9.4	57	299	351	465		590	243	100	27	46	32
23..........	11	55	214	351	398		660	123	95	28	49	39
24..........	64	48	150	328	398		525	98	273	73	39	290
25..........	68	42	150	305	398		436	98	273	64	32	131
26..........	53	39	184	282	366		290	308	222	46	32	98
27..........	23	37	184	233	327		243	356	157	42	26	64
28..........	23	37	184	184	337	810	346	268	144	80	22	64
29..........	98	33	120		....	495	268	207	157	57	20	55
30..........	192	42	184	340	....	398	337	157	273	42	20	46
31..........	132	....	465		....	264	....	126	....	57	20	....
1909-10.												
1..........	39	91	86	250	115	1,360	86	160	110	115	43	82
2..........	35	86	82	455	115	875	86	131	115	91	42	136
3..........	32	82	75	1,360	110	620	86	123	123	86	39	202
4..........	32	68	75	950	131	455	136	110	115	195	42	351
5..........	30	64	64	425	115	351	136	98	407	210	42	520
6..........	26	64	64	315	110	330	123	86	875	136	31	351
7..........	26	64	68	1,360	90	300	123	86	443	160	28	244
8..........	26	64	151	655		223	123	123	290	290	35	160
9..........	20	315	75	340	110	184	110	131	223	173	40	202
10..........	20	655	75	223	151	160	110	136	290	110	42	173
11..........	281	488	75	202	136	136	98	123	425	105	39	131
12..........	340	315	75	166		115	115	443	585	86	28	105
13..........	136	236	407	136	140	110	281	395	655	210	151	195
14..........	110	173	838	151		123	195	267	552	173	45	223
15..........	98	160	340	136		123	166	195	585	123	35	142
16..........	110	136	223	136	184	110	160	160	2,290	91	42	110
17..........	105	115	195	123	620	110	236	136	1,280	91	32	86
18..........	86	105	160	195	1,030	98	368	184	585	123	26	75
19..........	110	98	82	725	585	86	267	160	520	136	26	64
20..........	110	86		368	315	86	244	136	340	91	35	64
21..........	91	86		1,190	267	123	290	210	330	75	26	55
22..........	86	86	125	585	520	110	330	195	443	68	86	46
23..........	123	98		368	395	110	725	166	267	50	43	43
24..........	281	115		267	267	110	655	151	184	46	32	35
25..........	195	91	128	195	267	110	468	166	131	35	26	875
26..........	184	86		160	202	110	368	142	105	166	26	455
27..........	173	86		184	184	98	290	115	131	105	26	223
28..........	160	82	100	166	875	98	267	105	351	86	26	340
29..........	142	82		142	....	98	223	91	223	64	20	195
30..........	123	98		142	....	86	184	86	151	64	18	166
31..........	110	....		131	....	86	....	86	....	60	16	....

Daily discharge, in second-feet, of Cherry River at Richwood, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910-11.												
1	136	110	267	762	655	110	145	123	315	54	24	112
2	142	123	223	1,890	585	110	142	123	115	43	18	55
3	105	136	166	1,710	395	98	340	110	68	106	14	43
4	91	131	142	875	330	110	725	91	46	43	13	50
5	75	110	131	488	253	86	1,620	75	202	36	43	152
6	64	110	136	368	195	875	838	64	151	50	68	120
7	75	91	123	244	166	690	520	64	105	98	32	92
8	223	86	110	202	184	407	455	64	86	126	85	59
9	368	86	105	166	244	290	585	64	51	55	40	845
10	202	75	86	151	223	300	378	51	39	43	34	288
11	142	75	86	136	195	395	290	42	43	106	24	246
12	131	64	86	620	166	340	300	46	136	87	20	232
13	105	64	86	2,610	142	455	407	43	98	55	28	179
14	86	64		1,360	123	395	585	39	71	40	30	152
15	75	64	90	1,620	115	300	762	32	59	30	36	415
16	64	60		1,030	105	244	395	28	55	34	190	810
17	64	55	100	520	86	202	315	32	46	47	59	415
18	60	55	100	368	98	184	244	32	64	46	36	232
19	50	46	160	267	136	300	223	32	64	32	28	190
20	46	46	142	202	115	620	620	26	64	24	24	171
21	46	43		267	86	368	500	20	46	26	24	130
22	142	39	145	585	110	290	520	20	35	36	18	142
23	123	32		468	110	368	533	20	32	30	16	92
24	86	46	151	340	86	236	368	184	28	36	13	59
25	64	290	290	253	86	195	325	64	42	68	16	64
26	64	160	166	520	86	151	244	42	46	50	24	55
27	68	131	160	655	123	356	210	43	64	36	18	46
28	184	425	160	762	151	236	173	32	115	28	14	142
29	131	520	875	875	....	202	166	30	51	24	32	146
30	115	315	2,000	2,720	....	244	128	28	36	20	59	114
31	110	....	762	762	....	177	....	136	....	24	171	....
1911-12.												
1	80	80	232	505	304	330	445	385	47	64	160	152
2	705	68	198	358	211	255	775	320	43	54	120	120
3	602	64	160	288	198	211	775	278	47	50	98	100
4	385	59	126	232	152	160	538	224	39	87	80	152
5	255	59	106	146	171	146	445	190	36	120	64	92
6	179	304	106		190	120	330	171	30	73	54	82
7	304	570	98		190	120	385	570	36	54	50	64
8	538	330	98	125		120	415	538	26	47	43	50
9	358	241	98			211	330	415	22	59	43	44
10	255	198	120			190	304	330	20	120	68	40
11	415	160	126		130	171	224	304	16	445	68	34
12	475	190	152	114		190	190	1,870	16	224	98	31
13	358	320	126	87		570	160	995	16	136	87	24
14	278	232	120	80		385	152	670	16	152	59	22
15	775	224	126	68	59	3,150	146	538	15	505	39	22
16	602	190	241	80	59	1,490	241	2,930	18	415	34	34
17	670	152	278		54	775	190	1,400	50	211	30	36
18	1,670	445	224	92	73	635	320	670	92	232	30	34
19	775	415	171	255	87	705	255	505	224	330	106	50
20	505	304	152	358	182	1,310	224	358	171	211	136	36
21	314	269	152	211	775	995	190	269	80	152	106	31
22	288	211	160	190	920	882	211	224	59	152	171	22
23	330	160	505	152	505	538	269	182	198	120	114	358
24	269	190	385	152	385	995	232	146	87	92	68	570
25	179	224	385	120	288	845	198	120	171	1,070	61	358
26	160	171	385	120	1,490	602	182	114	160	670	64	215
27	126	160	635	106	1,310	415	255	87	126	385	92	215
28	114	198	505	106	670	330	570	73	171	232	64	163
29	160	358	358	190	475	1,670	255	68	98	232	740	130
30	92	269	278	635	....	920	445	59	73	269	385	114
31	87	....	538	385	....	602	....	50	....	182	215	....

Daily discharge, in second-feet, of Cherry River at Richwood, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13.												
1	92	87	54	358	358	445	299	314	602	215	49	39
2	82	100	73	288	320	358	250	278	415	90	90	29
3	75	82	241	358	415	260	194	219	278	385	61	29
4	64	68	228	358	705	215	182	171	278	250	44	29
5	55	64	358	304	475	207	156	142	190	117	39	23
6	55	64	475	740	330	182	156	136	152	845	31	19
7	50	1,490	445	1,970	269	123	139	136	264	309	29	21
8	47	1,070	358	1,970	283	123	123	106	358	175	29	31
9	44	570	241	995	237	133	109	92	304	126	23	49
10	40	358	198	635	175	175	109	80	219	505	23	29
11	34	273	179	538	299	810	114	68	179	260	21	19
12	34	211	126	635	538	570	330	68	142	198	54	19
13	31	179	112	505	330	475	330	59	112	149	215	19
14	36	198	126	385	283	1,670	309	59	92	117	126	19
15	34	171	112	304	215	920	1,490	63	80	330	61	19
16	34	136	98	255	175	670	705	100	68	241	54	15
17	28	126	85	211	156	445	475	358	59	149	42	52
18	28	112	85	198	123	320	358	294	50	126	29	106
19	163	112	90	179	114	250	304	211	43	1,490	186	52
20	175	106	66	160	175	215	246	163	40	810	241	40
21	109	98	63	228	283	207	190	179	43	358	117	845
22	87	85	66	219	445	182	171	171	50	215	475	385
23	385	85	80	211	415	146	142	602	106	167	740	182
24	190	73	63	505	320	139	136	958	63	167	273	114
25	175	73	73	538	215	139	120	505	59	385	175	75
26	163	63	98	445	207	250	112	358	358	198	133	59
27	163	63	85	385	269	2,600	358	1,490	142	139	90	55
28	146	59	85	283	635	920	358	1,400	106	103	66	64
29	130	49	90	224	....	602	385	705	75	66	57	40
30	114	54	475	182	....	445	475	538	59	66	49	52
31	92	....	570	224	....	358	....	1,310	....	57	42	....
1913-14.												
1	55	156	538	171	705	171	740	219	25	5.2	8.0	39
2	55	130	920	146	445		1,070	179	25	8.4	8.0	29
3	320	106	538	160	330	150	775	142	21	19	8.0	29
4	246	100	415	152	269		475	142	21	12	7.2	21
5	146	87	304	120	269		358	219	25	14	8.0	19
6	106	75	211	114	255	114	269	570	29	11	8.0	15
7	95	75	358	106	385	109	232	385	21	8.4	7.2	15
8	75	80	385	106	330	100	882	314	21	7.6	14	15
9	64	294	320	211	241	87	670	264	17	61	16	12
10	100	203	232	304	232	100	445	219	15	21	43	12
11	95	182	211	232	190	114	330	186	14	14	24	14
12	130	182	182	198	190	92	278	160	14	11	85	31
13	100	294	152	232	152	100	215	149	17	8.0	63	26
14	80	1,230	136	190	152	92	182	136	14	80	32	19
15	75	1,970	126	190	160	203	330	112	12	63	20	14
16	70	1,870	120	152	146	538	1,400	98	9.2	40	16	12
17	59	670	120	126	146	845	740	85	8.4	30	13	11
18	87	505	136	114	152	740	475	80	7.6	32	10	9.6
19	100	445	126	120	920	475	358	73	6.4	20	8.0	7.6
20	505	320	120	330	920	330	775	63	9.2	14	8.0	7.6
21	415	255	120	1,310	475	278	635	63	11	13	59	7.6
22	294	194	120	635	330	215	445	54	11	10	36	7.6
23	385	163	120	415	330	182	330	54	11	8.0	20	7.6
24	1,070	130	152	385	278	190	264	46	15	8.0	22	7.6
25	1,230	123	152	995	211	445	219	43	15	8.0	63	9.6
26	1,490	100	505	570	190	1,310	1,150	39	17	13	309	12
27	740	100	330	445	190	1,310	670	32	12	55	133	9.6
28	445	385	255	385	160	1,580	445	30	9.2	24	66	7.6
29	320	445	224	602	....	1,070	330	25	8.4	16	103	7.6
30	237	320	198	775	....	1,070	264	37	6.4	13	66	7.6
31	194	....	182	1,490	....	995	....	31	....	12	54	....

Daily discharge, in second-feet, of Cherry River at Richwood, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-1915.												
1	5.8	73	304	288	1,150	182	120	255	146	26	40	63
2	5.8	68	330	224	2,380	182	120	198	130	87	75	46
3	5.8	64	330	190	1,310	126	120	255	163	40	309	54
4	4.8	50	269	152	670	106	106	224	260	36	130	98
5	7.6	50	1,670	126	505	106	114	198	190	224	68	314
6	29	47	602	635	505	120	224	152	139	139	47	207
7	19	43	585	2,380	358	114	475	146	109	64	40	142
8	14	36	304	810	269	92	445	120	114	92	34	112
9	18	43	255	570	198	92	445	106	87	152	25	85
10	20	36	232	320	182	87	385	87	75	82	24	63
11	18	36	171	255	160	120	330	68	64	64	87	54
12	13	36	152	445	152	92	320	73	47	55	120	46
13	15	30	136	278	182	106	255	87	36	44	64	39
14	55	30	126	224	538	80	211	64	215	36	47	43
15	64	68	123	330	1,580	126	152	50	152	28	100	30
16	358	241	120	320	845	152	120	50	109	28	64	22
17	156	190	136	775	505	160	114	43	82	146	152	15
18	114	120	126	1,870	330	87	106	36	114	215	635	23
19	70	106	120	1,670	255	106	92	36	82	92	232	98
20	55	92	445	705	190	106	87	39	50	415	139	63
21	43	87	538	445	160	87	80	54	40	475	163	288
22	44	68	570	278	152	73	68	39	34	278	215	198
23	43	50	330	255	152	68	73	39	28	163	182	98
24	59	36	255	288	1,070	68	73	43	22	139	130	80
25	190	50	198	241	635	68	68	39	18	75	109	59
26	114	43	152	211	385	160	64	59	15	55	75	46
27	87	43	182	171	278	120	54	106	15	44	61	66
28	68	39	190	126	255	136	445	64	12	34	109	136
29	64	36	190	92	....	146	705	59	9	28	175	90
30	68	92	705	98	....	152	385	232	10	28	100	66
31	92	....	415	98	....	136	....	211	....	34	82	....
1915-1916.												
1	4,330	26	123	635	845	203	358	171	133	49	61	15
2	1,310	26	109	920	570	211	294	142	98	117	325	18
3	635	22	95	570	385	171	246	130	241	167	149	19
4	415	22	82	330	299	130	203	219	186	68	167	14
5	314	22	70	269	224	136	171	171	133	44	241	11
6	219	22	61	260	215	142	171	142	133	35	167	16
7	142	22	61	237	358	1,310	142	142	273	29	241	11
8	117	22	61	182	283	958	142	130	260	21	273	15
9	90	22	47	215	269	602	136	278	288	23	958	34
10	85	22	44	194	283	415	120	179	250	24	570	18
11	66	14	44	1,150	250	219	278	142	186	109	325	10
12	59	22	44	1,150	260	203	995	112	133	44	475	9.2
13	49	40	44	1,070	570	190	810	100	103	31	358	8.0
14	46	35	31	670	445	882	538	80	68	29	309	10
15	46	505	34	475	445	958	385	68	299	29	215	2,070
16	39	358	47	330	283	538	294	75	445	385	288	505
17	32	241	123	207	182	358	264	75	602	775	273	241
18	32	198	2,710	156	167	304	203	68	309	358	186	146
19	136	635	810	175	146	264	163	55	215	207	139	80
20	112	505	538	167	123	211	142	43	215	260	198	68
21	85	330	283	224	175	255	136	43	175	330	109	59
22	66	264	215	445	175	1,070	179	37	139	845	149	39
23	59	211	175	538	224	882	136	130	98	995	198	36
24	46	171	139	358	475	538	120	190	90	505	109	34
25	46	136	194	269	882	415	330	112	309	241	68	24
26	43	112	237	215	505	358	415	171	207	167	54	20
27	43	273	194	224	358	475	415	106	133	139	42	16
28	35	241	237	194	260	670	358	92	98	288	31	16
29	32	198	2,600	260	207	635	264	68	73	139	29	810
30	32	149	1,070	670	....	475	219	255	49	98	23	278
31	32	....	570	475	....	445	....	232	....	66	19	....

NOTE.—Daily discharge estimated or interpolated, because of ice or missing gage readings, from observer's notes, climatic data, or by comparison with the flow at other stations as follows: July 1, Aug. 2, 12, 13, Nov. 6, Dec. 9-14, 20-23, 1908; Jan. 9, 21, 24, 25, 27, 29-31, Feb. 1-12, Mar. 12-27, July 18, Dec. 20-24, 26-31, 1909; Jan. 1, Feb. 7, 8, 12-15, Dec. 14-16, 21-23, 1910; Jan. 6-11, 16-17, Feb. 8-14, 1912; Feb. 7-8, Mar. 2-5, Dec. 15, 1914. Braced figures show the mean for the period.

Monthly discharge of Cherry River at Richwood, W. Va., for the years ending Sept. 30, 1908-1916.

Month	Discharge in second-feet Maximum	Minimum	Mean	Per square mile	Run-off in inches
1908.					
July	1,390	46	258	2.87	3.31
August	382	28	96.1	1.07	1.23
September	46	6	17.8	.198	.22
1908-9.					
October	192	4.8	32.3	.359	.41
November	120	15	44.8	.498	.56
December	735	28	218	2.42	2.79
January	1,140	150	426	4.73	5.45
February	1,220	327	446	4.96	5.16
March	1,220	264	530	5.89	6.79
April	1,740	157	379	4.21	4.70
May	590	78	244	2.71	3.12
June	356	95	178	1.98	2.21
July	590	27	142	1.58	1.82
August	223	6.0	40.2	.447	.52
September	290	16	70.8	.787	.88
The year	1,740	4.8	228	2.53	34.41
1909-10.					
October	340	20	111	1.23	1.42
November	655	64	146	1.62	1.81
December	838	64	147	1.63	1.88
January	1,360	123	394	4.38	5.05
February	1,030	....	269	2.99	3.11
March	1,360	86	229	2.54	2.93
April	725	86	235	2.61	1.91
May	443	86	158	1.76	2.03
June	2,290	105	437	4.86	5.42
July	290	35	117	1.30	1.50
August	151	16	38.3	.426	.49
September	875	35	202	2.24	2.50
The year	2,290	16	206	2.29	31.05
1910-11.					
October	368	46	111	1.23	1.42
November	520	32	122	1.36	1.52
December	2,090	86	245	2.72	3.14
January	2,720	136	768	8.53	9.83
February	655	86	191	2.12	2.21
March	875	86	301	3.34	3.85
April	1,620	128	435	4.83	5.39
May	184	20	58.1	.646	.74
June	315	28	79.1	.879	.98
July	126	20	49.5	.550	.63
August	190	13	40.4	.449	.52
September	845	43	195	2.17	2.42
The year	2,720	13	217	2.41	32.65
1911-12.					
October	1,670	80	395	4.39	5.06
November	570	59	227	2.52	2.81
December	635	98	237	2.63	3.03
January	635	68	189	2.10	2.42
February	1,490	54	333	3.70	3.99
March	3,150	120	646	7.18	8.28
April	775	146	322	3.58	3.99
May	2,930	50	486	5.40	6.23
June	224	15	73.4	.816	.91
July	1,070	47	230	2.56	2.95
August	740	30	114	1.27	1.46
September	570	22	113	1.26	1.41
The year	3,150	15	281	3.12	42.54

Monthly discharge of Cherry River at Richwood, W. Va., for the years ending Sept. 30, 1908-1916—Continued.

Month	Discharge in second-feet				Run-off in inches
	Maximum	Minimum	Mean	Per square mile	
1912-13.					
October	385	28	95.3	1.06	1.22
November	1,490	49	209	2.32	2.59
December	570	54	177	1.97	2.27
January	1,970	160	477	5.30	6.11
February	705	114	313	3.48	3.62
March	2,600	123	469	5.21	6.01
April	1,490	109	294	3.27	3.65
May	1,490	59	366	4.07	4.69
June	602	40	166	1.84	2.05
July	1,490	57	284	3.16	3.64
August	740	21	118	1.31	1.51
September	845	15	84.3	.937	1.04
The year	2,600	15	255	2.83	38.40
1913-14.					
October	1,490	55	303	3.37	3.88
November	1,970	75	373	4.14	4.62
December	920	120	258	2.87	3.31
January	1,490	106	370	4.11	4.74
February	920	146	313	3.48	3.62
March	1,580	87	434	4.82	5.56
April	1,400	182	525	5.83	6.50
May	570	25	137	1.52	1.75
June	29	6.4	14.9	.166	.18
July	80	5.2	21.3	.237	.27
August	309	7.2	43.1	.479	.55
September	39	7.6	14.7	.163	.18
The year	1,970	5.2	233	2.59	35.16
1914-15.					
October	358	4.8	61.9	.688	.79
November	241	30	66.8	.742	.83
December	1,670	120	325	3.61	4.16
January	2,380	92	480	5.33	6.14
February	2,380	152	548	6.09	6.34
March	182	68	115	1.28	1.48
April	705	54	212	2.36	2.63
May	255	36	104	1.16	1.34
June	260	9	85.6	.951	1.06
July	475	26	110	1.22	1.41
August	635	24	124	1.38	1.59
September	314	15	91.5	1.02	1.14
The year	2,380	4.8	192	2.13	28.91
1915-16.					
October	4,330	32	284	3.16	3.64
November	635	14	162	1.80	2.01
December	2,710	31	358	3.98	4.59
January	1,150	156	427	4.74	5.46
February	882	123	340	3.78	4.08
March	1,310	130	472	5.24	6.04
April	995	120	288	3.20	3.56
May	278	37	128	1.42	1.64
June	602	49	198	2.20	2.45
July	995	21	213	2.37	2.73
August	958	19	218	2.42	2.79
September	2,070	8	155	1.72	1.93
The year	4,330	8	271	3.01	40.92

Cherry River at Fenwick, W. Va.

Location.—Chain gage at highway bridge at Fenwick, Nicholas County, 1,000 feet below mouth of Laurel Creek.
Drainage area.—150 square miles.
Records available.—September, 1929, to September, 1930.
Extremes—Maximum gage height during year, 12.04 feet Oct. 2 (discharge not determined); minimum, 0.1 second-foot Sept. 20 (gage height, 2.62 feet).
Remarks.—Records good.

Daily and monthly discharge, in second-feet, 1929-30.

Day.	Sept.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	....	33	190	163	....	242	125	42	5.8	2.0	2.4
2	....	6,120	178	158	....	455	125	32	5.8	1.8	1.7
3	....	3,510	885	150	....	960	58	34	5.5	.5	1.4
4	....	1,700	780	158	....	1,340	37	26	4.1	.5	1.1
5	....	920	780	181	....	850	95	21	2.8	.7	1.1
6	....	590	a 600	204	....	780	123	23	2.0	1.4	1.0
7	....	340	a 450	211	....	1,000	105	23	2.0	2.4	.7
8	....	253	360	208	....	960	82	30	1.7	2.2	.4
9	....	218	380	184	1,250	815	61	22	.7	1.1	.5
10	....	181	a 250	172	920	745	60	31	.7	.7	.7
11	....	135	255	163	960	620	58	42	.5	1.0	1.0
12	....	66	222	158	885	480	75	25	.5	2.2	.4
13	....	51	204	150	780	360	79	18	1.1	.7	.5
14	55	47	194	150	885	590	88	14	3.0	3.0	.4
15	51	39	228	197	745	455	140	14	8.8	6.4	.3
16	39	69	530	246	650	340	505	12	8.2	14	.4
17	58	95	a1,200	239	590	300	280	10	7.0	10	.4
18	58	69	5,240	....	680	280	340	11	10	7.6	.3
19	43	57	1,890	....	1,610	300	405	10	3.9	5.5	.2
20	34	50	1,000	....	960	253	405	10	2.0	6.4	.1
21	21	54	a 750	....	680	222	320	9.6	1.5	5.5	.2
22	19	a 300	a 550	....	480	360	236	7.9	2.2	3.4	.2
23	18	a 500	a 400	....	360	280	166	6.4	1.2	3.6	.2
24	16	a 400	280	....	300	225	140	7.0	1.7	3.2	.2
25	16	a 300	256	....	280	200	123	4.1	.7	4.1	7.6
26	14	a 250	246	....	300	181	91	4.9	.8	3.6	4.9
27	12	a 250	239	....	236	150	88	6.1	2.2	2.8	2.2
28	12	253	208	....	214	138	75	8.2	2.6	2.0	2.0
29	12	239	184	....	256	131	64	7.6	2.8	1.4	2.2
30	20	218	175	....	300	125	58	5.8	1.0	1.1	.8
31	....	204	....	....	256	....	51	....	1.4	1.4	....

Month	Maximum	Minimum	Mean	Per square mile	Run-off in inches
1929					
September 14-30	58	12	29.3	0.195	0.12
1929-30.					
October	6,120	33	565	3.77	4.35
November	5,240	175	637	4.25	4.74
December 1-17	246	150	182	1.21	.76
March 9-31	1,610	214	634	4.23	3.62
April	1,340	125	471	3.14	3.50
May	505	37	150	1.00	1.15
June	42	4.1	17.3	.115	.13
July	10	.5	3.04	.020	.02
August	14	.5	3.30	.022	.03
September	7.6	.1	1.18	.0079	.009

a Estimated.
NOTE.—No record obtained Dec. 18 to Mar. 8.

Cherry River at Fenwick, W. Va.

Location.—Chain gage at highway bridge at Fenwick, Nicholas County, 1,000 feet below mouth of Laurel Creek.

Drainage area.—150 square miles.

Records available.—September, 1929, to September, 1931.

Extremes.—Maximum discharge during year, 4,960 second-feet Apr. 4 (gage height, 9.44 feet); minimum, 0.3 second-foot Oct. 10, 14 (gage height, 2.70 feet).

1929-1931: Maximum gage height, 12.04 feet Oct. 2, 1929 (discharge not determined); minimum discharge, 0.1 second-foot Sept. 22, 1930 (gage height, 2.62 feet).

Remarks.—Records good.

Daily and monthly discharge, in second-feet, 1930-31.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.8	1.4	123	90	300	710	680	340	300	34	77	194
2	.7	1.2	84	45	256	1,000	560	280	250	109	1,080	148
3	.5	1.4	40	77	211	530	1,160	246	228	155	2,490	228
4	.8	1.8	27	75	190	430	4,680	236	187	84	1,610	222
5	.8	2.6	20	405	117	320	2,290	184	152	75	745	125
6	.4	2.2	405	1,990	99	260	1,700	166	172	88	430	97
7	.8	2.6	455	780	138	340	960	228	320	115	320	93
8	1.2	2.8	54	480	360	430	920	1,160	505	86	280	74
9	.5	3.6	218	250	1,890	340	1,790	780	430	88	280	55
10	.3	3.2	84	211	1,340	280	2,390	710	340	181	256	45
11	.6	3.4	72	175	680	222	2,600	455	300	184	222	71
12	.6	3.2	190	190	530	166	2,290	430	197	125	242	81
13	.8	4.7	117	160	360	155	1,430	560	225	88	300	63
14	.5	6.7	101	84	480	256	1,000	1,520	620	74	197	36
15	.5	5.8	66	71	815	1,610	815	1,250	1,520	208	129	34
16	.5	6.4	32	23	405	1,000	710	780	1,000	99	95	64
17	1.1	7.6	40	125	530	650	680	710	560	72	74	109
18	1.7	5.5	47	99	1,080	560	360	1,120	360	77	60	82
19	1.1	6.7	41	138	1,120	780	300	1,160	250	46	84	60
20	.7	7.3	33	300	745	710	253	1,250	190	55	320	34
21	.7	5.8	22	155	530	560	232	1,990	239	50	1,340	36
22	.8	7.0	19	81	430	620	260	2,090	218	43	1,430	50
23	.7	7.0	23	91	340	530	430	2,930	178	42	2,190	39
24	1.2	5.5	20	125	320	650	430	1,700	160	320	1,120	66
25	1.8	5.8	17	181	300	850	530	1,120	105	150	680	101
26	1.4	7.0	155	320	246	710	780	680	88	88	505	480
27	1.4	7.6	360	745	228	680	745	530	69	75	360	505
28	1.8	7.9	211	960	320	1,520	710	480	58	66	360	430
29	1.8	7.6	150	680	....	2,090	560	380	50	54	480	340
30	2.0	11	99	505	....	1,160	280	246	46	42	380	250
31	1.7	....	63	405	....	780	....	280	....	26	260	....

Month	Maximum	Minimum	Mean	Per square mile	Run-off in inches
October	2.0	0.3	0.97	0.0065	0.007
November	11	1.2	5.08	.034	.04
December	455	17	109	.727	.84
January	1,990	23	323	2.15	2.48
February	1,890	99	513	3.42	3.56
March	2,090	155	674	4.49	5.18
April	4,680	232	1,080	7.20	8.03
May	2,930	166	838	5.59	6.44
June	1,520	46	311	2.07	2.31
July	320	26	96.7	.645	.74
August	2,490	60	593	3.95	4.55
September	505	34	140	.933	1.04
The year	4,680	.3	390	2.60	35.22

Cherry River at Fenwick, W. Va.

Location.—Chain gage at highway bridge at Fenwick, Nicholas County, 1,000 feet below mouth of Laurel Creek.

Drainage area.—150 square miles.

Records available.—September, 1929, to September, 1932.

Extremes.—Maximum gage height during year, 14.58 feet July 4 (discharge not determined); minimum discharge, 0.1 second-foot Sept. 13 (gage height, 2.60 feet).
1929-32: Maximum gage height, that of July 4, 1932 (discharge not determined); minimum discharge, 0.1 second-foot Sept. 22, 1930, Sept. 13, 1932 (gage height, 2.60 feet).

Remarks.—Records good.

Discharge, in second-feet, 1931-32.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	175	115	455	1,700	885	236	1,790	2,390	41	236	21	5.2
2	123	163	590	1,340	815	214	1,250	1,520	37	214	20	3.9
3	97	152	455	885	1,340	204	780	885	51	197	61	47
4	77	109	430	680	4,140	1,160	710	620	50	8,300	300	16
5	61	138	380	780	2,290	1,120	430	430	43	5,240	93	12
6	58	121	300	1,700	1,160	1,080	530	360	39	3,630	97	9.2
7	53	105	280	1,990	710	885	505	300	33	1,790	60	7.6
8	50	97	260	1,340	710	650	455	239	26	1,120	50	5.5
9	43	90	380	1,250	710	960	340	228	36	530	37	7.0
10	39	81	1,000	1,080	620	815	300	222	21	260	34	12
11	43	72	960	815	505	560	360	430	19	590	55	3.2
12	47	71	1,990	505	1,080	300	815	815	23	340	77	1.4
13	43	74	3,040	455	885	197	590	1,160	75	225	47	.1
14	48	79	2,390	340	710	142	480	920	138	152	28	2.2
15	55	72	1,430	280	530	105	430	650	90	197	21	.3
16	63	66	780	239	360	140	340	505	67	187	17	2.6
17	86	69	620	204	430	4,270	300	405	72	138	15	1.4
18	91	63	455	214	745	3,270	232	300	54	88	16	1.7
19	82	64	430	194	530	1,340	204	256	43	64	101	1.2
20	60	63	430	166	430	1,120	181	190	35	51	41	2.2
21	60	55	430	158	340	1,000	158	194	27	37	34	1.8
22	54	54	455	158	380	1,790	140	480	32	46	24	2.4
23	48	57	780	269	340	1,120	125	242	25	63	16	9.6
24	43	51	650	380	256	815	142	178	20	71	13	11
25	54	57	560	360	239	650	300	142	14	46	11	8.8
26	48	51	480	300	218	455	530	133	16	30	9.2	5.5
27	43	84	430	620	214	1,080	480	109	16	31	7.3	7.3
28	57	280	430	560	190	9,560	455	90	2,090	31	5.8	7.0
29	72	300	505	1,430	222	3,880	430	74	1,040	47	7.3	4.9
30	84	320	480	4,540	....	1,610	620	71	380	40	7.6	11
31	95	....	455	3,270	....	1,610	....	60	....	28	7.3	....

Month	Maximum	Minimum	Mean	Per square mile	Run-off in inches
October	175	39	66.2	0.441	0.51
November	320	51	106	.707	.79
December	3,040	260	733	4.89	5.64
January	4,540	158	910	6.07	7.00
February	4,140	190	758	5.05	5.45
March	9,560	105	1,370	9.13	10.53
April	1,790	125	480	3.20	3.57
May	2,390	60	471	3.14	3.62
June	2,090	14	155	1.03	1.15
July	8,300	28	775	5.17	5.96
August	300	5.8	43.0	.287	.33
September	47	.1	7.03	.047	.05
The year	9,560	.1	491	3.27	44.60

Cherry River at Fenwick, W. Va.

Location.—Chain gage at highway bridge at Fenwick, Nicholas County, 1,000 feet below mouth of Laurel Creek. Zero of gage is 2,088.94 feet above mean sea level.
Drainage area.—150 square miles.
Records available.—September, 1929, to September, 1934.
Extremes.—Maximum discharge recorded during year ending Sept. 30, 1933, 5,520 second-feet Jan. 21 (gage height, 9.84 feet); minimum, 7.2 second-feet Oct. 5 (gage height, 2.97 feet).

Maximum discharge recorded during year ending Sept. 30, 1934, 5,800 second-feet Mar. 5 (gage height, 10.04 feet); minimum, 3.1 second-feet Oct. 7 (gage height, 2.76 feet).

1929-34: Maximum gage height recorded, 14.58 feet July 4, 1932 (discharge not determined); minimum discharge, 0.1 second-foot Sept. 22, 1930, Sept. 13, 1932, (gage height, 2.60 feet).
Remarks.—Records fair. Discharge estimated Oct. 10, 14, 15, Nov. 29 to Dec. 4, Dec. 16, 1932, Jan. 27-29, Mar. 1, 2, Apr. 30 to May 20, Aug. 15, Sept. 27, 1933.

Discharge, in second-feet, 1932-33.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	682	110	780	425	500	748		175	358	266	66
2	9.2	590	110	590	715	400	815		126	274	285	45
3	8.9	380	100	450	650	293	885	283	111	1,200	748	48
4	8.0	293	100	380	590	259	815		95	502	4,010	97
5	8.9	248	93	335	425	181	650		89	282	1,420	210
6	204	194	86	248	282	197	748		63	184	650	69
7	115	161	79	197	335	335	1,510		60	118	380	68
8	33	156	77	207	2,450	850	995	867	40	81	259	46
9	22	1,330	69	358	1,420	650	748		99	68	178	28
10	24	1,780	72	530	682	502	560		650	76	148	46
11	26	885	76	450	502	380	530		204	150	620	26
12	17	650	241	502	314	380	1,780		143	314	560	23
13	18	380	314	402	314	380	995	814	146	143	475	16
14	15	278	282	335	958	2,750	715		91	109	475	36
15	15	241	234	285	1,870	3,750	530		64	278	220	37
16	38	234	150	210	1,330	1,690	475		76	425	133	115
17	1,240	293	150	220	1,070	958	590		66	270	120	79
18	715	259	175	263	850	1,330	502	1,290	54	158	97	28
19	402	1,960	175	450	850	2,550	590		44	111	89	38
20	380	1,200	140	380	1,960	2,250	475		35	88	63	46
21	266	748	140	4,400	1,600	2,250	402	274	26	77	61	36
22	181	450	187	2,950	995	1,330	358	230	22	60	53	36
23	131	314	358	1,510	715	885	282	200	18	44	45	28
24	101	285	475	885	620	650	244	178	16	38	314	17
25	81	244	682	850	682	530	293	200	52	36	161	15
26	89	220	502	1,030	1,420	475	358	224	167	111	77	12
27	748	184	530	700	815	335	335	200	230	1,030	45	12
28	402	148	2,250	530	682	402	285	210	650	1,240	60	14
29	314	125	1,150	450	....	450	259	178	1,240	1,780	153	15
30	213	120	885	380	....	450	220	230	850	502	122	12
31	227	....	780	335	....	502	....	217	....	475	84	....

Month	Maximum	Minimum	Mean	Per square mile	Run-off in inches
October	1,240	8.0	196	1.31	1.51
November	1,960	120	501	3.34	3.73
December	2,250	69	347	2.31	2.66
January	4,400	197	697	4.65	5.36
February	2,450	282	911	6.07	6.32
March	3,750	181	929	6.19	7.14
April	1,780	220	623	4.15	4.63
May	....	178	599	3.99	4.60
June	1,240	16	190	1.27	1.42
July	1,780	36	341	2.27	2.62
August	4,010	45	399	2.66	3.07
September	210	12	45.5	.303	.34
The year	4,400	8.0	480	3.20	43.40

Cherry River at Fenwick, W. Va.
(Continued)
Discharge, in second-feet, 1933-34.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.5	8.9	425	885	172	270	502	234	77	14	32	17
2	17	7.5	335	1,240	213	1,420	425	204	64	20	129	15
3	35	16	314	715	181	4,680	314	181	45	14	682	24
4	18	19	314	560	158	4,400	293	161	36	8.9	358	10
5	14	28	402	590	150	4,960	278	143	35	10	175	15
6	13	136	815	748	109	2,550	227	131	68	8.3	103	12
7	3.3	77	995	1,110	71	1,600	255	120	172	7.8	76	12
8	6.2	79	780	958	113	2,150	248	105	91	9.8	68	10
9	6.2	66	590	748	103	1,780	220	95	64	13	42	7.5
10	5.5	45	314	530	99	1,030	197	136	68	9.5	32	7.0
11	12	46	234	380	77	1,510	200	590	77	8.3	66	7.0
12	8.6	64	158	335	84	1,110	259	293	69	14	60	5.3
13	7.0	71	204	285	103	715	335	248	55	12	74	9.8
14	5.3	81	224	244	95	502	380	335	40	14	52	15
15	8.3	131	207	227	122	293	450	682	32	15	35	12
16	8.0	120	234	181	138	358	560	650	24	8.3	682	402
17	181	164	380	133	140	335	650	560	20	5.3	780	335
18	97	380	650	101	146	380	850	314	16	6.0	278	136
19	36	335	1,110	143	158	650	815	194	278	6.0	143	86
20	42	207	3,750	93	148	995	780	194	107	5.3	105	58
21	14	184	2,650	101	143	780	650	158	81	4.5	88	38
22	31	285	2,150	118	122	715	530	138	45	5.8	55	40
23	29	293	2,150	138	170	530	380	133	42	4.9	63	31
24	31	220	1,600	156	120	425	358	122	49	6.8	89	26
25	25	178	358	178	133	402	285	111	31	8.6	101	48
26	11	158	358	175	172	560	244	95	22	6.2	84	45
27	12	197	293	190	230	1,960	293	84	18	5.3	74	36
28	20	285	241	194	282	2,250	335	74	16	402	46	41
29	18	282	153	213	....	1,330	293	66	12	95	31	131
30	20	314	93	200	....	850	259	58	14	72	35	1,690
31	17	....	207	190	....	682	....	57	....	48	22	....

Month	Maximum	Minimum	Mean	Per square mile	Run-off in inches
October	181	3.3	24.5	0.163	0.19
November	380	7.5	149	.993	1.11
December	3,750	93	732	4.88	5.63
January	1,240	93	389	2.59	2.99
February	282	71	141	.940	.98
March	4,960	270	1,360	9.07	10.46
April	850	197	396	2.64	2.94
May	682	57	215	1.43	1.65
June	278	12	58.9	.393	.44
July	402	4.5	28.0	.187	.22
August	780	22	150	1.00	1.15
September	1,690	5.3	111	.740	.83
The year	4,960	3.3	316	2.11	28.59

Cherry River at Fenwick, W. Va.

Location.—Chain gage, lat. 38°13′45″, long. 80°35′, at highway bridge at Fenwick, Nicholas County, 1,000 feet below mouth of Laurel Creek. Zero of gage is 2,088.94 feet above mean sea level.

Drainage area.—150 square miles.

Records available.—September, 1929, to September, 1935.

Extremes.—Maximum discharge observed during year, 4,740 second-feet Mar. 12 (gage height, 8.95 feet); minimum, 5 second-feet Oct. 5 (gage height, 2.97 feet).
1929-35: Maximum observed gage height, 14.58 feet July 4, 1932 (discharge not determined); minimum discharge, 0.1 second-foot Sept. 22, 1930, Sept. 13, 1932 (gage height, 2.60 feet).

Remarks.—Records fair.

Rating tables, water year 1934-35 (gage height, in feet, and discharge in second-feet)

Table for Oct. 1 to Mar. 11				Table for Mar. 12 to Sept. 30			
3.3	23	4.5	293	2.9	3.0	4.5	326
3.4	32	5.0	530	3.0	5.5	5.0	570
3.5	45	5.5	850	3.1	10	5.5	880
3.6	58	6.0	1,240	3.2	16	6.0	1,260
3.7	74	7.0	2,210	3.4	34	7.0	2,230
3.8	91	8.0	3,380	3.6	63	8.0	3,380
4.0	133	9.0	4,740	3.8	102	9.0	4,740
4.2	187			4.0	153		

Discharge, in second-feet, water year October, 1934, to September, 1935

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	425	336	1,700	402	185	425	2,900	142	348	100	246	18
2	278	422	1,110	475	153	402	1,820	209	302	290	174	12
3	190	263	815	380	136	358	1,140	392	326	326	109	19
4	136	293	682	314	105	314	845	348	1,440	174	119	61
5	111	380	502	278	79	314	655	318	1,060	515	142	622
6	402	475	402	227	86	358	625	465	655	655	92	598
7	402	590	335	264	64	314	778	3,220	440	1,020	2,310	322
8	282	450	274	217	99	293	655	1,720	322	1,620	2,450	225
9	190	335	217	450	133	266	685	880	415	1,440	950	168
10	148	241	187	620	530	314	598	715	306	778	542	156
11	122	190	187	502	530	2,030	655	490	218	369	465	87
12	95	170	238	358	475	4,040	745	392	183	268	326	67
13	74	153	230	282	402	2,230	1,220	490	183	189	199	47
14	64	146	111	259	475	1,180	1,060	810	140	140	369	44
15	61	111	91	227	748	988	880	1,180	159	232	225	43
16	53	105	95	417	748	1,020	655	1,060	153	162	148	33
17	50	103	81	2,000	560	745	570	988	137	94	100	30
18	42	101	89	1,700	402	625	542	715	369	77	74	21
19	42	105	86	885	335	515	542	515	348	63	68	21
20	37	89	86	2,000	270	745	440	465	348	52	55	22
21	36	86	289	2,430	187	685	369	778	264	76	57	20
22	31	99	217	2,540	230	880	326	655	490	76	44	18
23	31	2,130	175	2,100	314	2,560	279	685	515	72	38	14
24	35	1,600	178	1,800	748	2,900	232	685	415	96	28	11
25	30	748	207	995	650	2,670	205	745	286	369	22	10
26	54	530	958	590	1,070	1,815	171	625	196	490	16	7
27	49	380	815	425	885	1,100	142	440	156	392	61	9
28	58	335	682	358	560	845	148	348	119	246	37	7
29	79	1,310	560	314	....	715	137	294	137	162	22	7
30	45	1,110	502	244	....	598	153	655	124	98	21	5
31	38	....	425	215	....	1,960	....	515	....	63	20	....

Month	Second-foot-days	Maximum	Minimum	Mean	Per square mile	Run-off in inches
October	3,690	425	30	119	0.793	0.91
November	13,386	2,130	86	446	2.97	3.31
December	12,526	1,700	81	404	2.69	3.10
Calendar year 1934	116,934.2	4,960	4.5	320	2.13	28.98
January	24,208	2,540	204	781	5.21	6.01
February	11,159	1,070	64	399	2.66	2.77
March	34,204	4,040	266	1,103	7.35	8.47
April	20,172	2,900	13.7	672	4.48	5.00
May	21,939	3,220	142	708	4.72	5.44
June	10,554	1,440	119	352	2.35	2.62
July	10,704	1,620	52	345	2.30	2.65
August	9,529	2,450	16	307	2.05	2.36
September	2,724	622	5	90.8	.605	.68
Water year 1934-35	174,795	4,040	5	479	3.19	43.32

SINKS, CAVERNS, AND SUBSURFACE DRAINAGE.

Solution in Carbonate Rocks.—Pure water dissolves mineral matter but water containing oxygen, carbon dioxide, and acids is a vastly more efficient solvent. The rain water that reaches the rocks is not pure. In falling through the atmosphere it acquires oxygen and carbon dioxide, and in percolating through the crust of vegetation and the underlying soil in humid regions it absorbs more carbon dioxide as well as various organic acids formed by the decomposition of plant matter.

Limestone is soluble in water charged with carbon dioxide and therefore in humid regions, where rainfall is plentiful and evaporation relatively slight, it is vigorously attacked by subsurface water with striking results. Great holes are formed in the surface, caverns are hollowed out below ground, and surface streams are undermined and led away through subterranean channels. That subsurface water is responsible for this work is shown by the fact that the water of springs and wells in regions of limestone and dolomite is "hard"; that is, it contains much calcium carbonate in solution.

Sinks.—In compact, well-stratified limestones, such as those in Greenbrier County, the easiest descent for vadose water is through vertical joints and along bedding-planes. Those avenues most favorably situated with respect to supply from above and free circulation below are readily enlarged by solution as the descending water passes through them. Enlargement is most effective at the surface, where movement of the water is most rapid and where the water is freshly charged with carbon dioxide from the atmosphere and from decaying vegetation, and decreases rapidly downward. In consequence the point of intersection of two joints near the surface becomes a funnel-shaped depression. As the depression widens, the overlying mat of insoluble mantle and vegetation collapses into it, and a sink is formed. Sinks of this (funnel) type range in size from small openings only a few inches in diameter to great depressions hundreds of feet wide. Many are

remarkably symmetrical, whereas others exhibit irregularities resulting from differences in the composition and structure of the rocks.

Another type of sink-hole, quite common in Greenbrier County, is due to the collapse of the roof of underlying caverns. Sinks due to this cause are quite irregular in shape and are often elongated. They are usually steep walled and are often quite large. It is the exception, rather than the rule, for the cavern roofs to collapse suddenly and usually the settling is so gradual that it would hardly be noticed by a resident of the region.

The average sink-hole in Greenbrier County owes its origin to a combination of the two main causes discussed above. In general they have been excavated above the water-table, drain downward through openings in their floors and are therefore usually dry. The outlets of some, however, are clogged by clay, humus, and other insoluble matter washed into them, allowing the development of small lakes whose levels are above the water-table and independent of it. In some sinks the water leaks away slowly; in others the insoluble stopper is suddenly broken through and the lake disappears with a rush.

Caverns.—Caverns of many sizes and shapes occur in the limestones of Greenbrier County. In so far as they have been explored most of the caverns are small, many of them hardly extend beyond the twilight zone. From the vast area in which no surface streams are present it is apparent that many of these small caverns must interconnect. However, these connecting passageways may be small and difficult to traverse. Some of the caves are smooth walled, showing only the effects of solution, while others are sparingly ornamented with calcite deposited from solution.

The process of precipitation by subsurface waters is clearly evident in the deposits of calcite in the form of dripstone. Vadose (ground) water charged with calcium carbonate percolates downward from the surface of the ground to the roof of the cavern, where, clinging to the ceiling, it forms drops. While at rest it evaporates a little, loses some carbon dioxide and therefore deposits some calcium carbonate.

Then, as more water is added from above, it is forced to drop, falling on the floor below, it evaporates still further, leaving another minute deposit. As the drops slowly but endlessly succeed each other, long "icicles" of calcite (stalactites) grow downward from the roof, while broader accumulations (stalagmites) grow upward from the floor. If the process goes on long enough each pair coalesces and forms a column. Dripstone assumes many fantastic shapes, curious to the cavern visitor, but all are formed in this simple way.

In past times caverns often served as refuges for primitive man and as dens for animals that are now extinct. Because of this the bones of men and animals, stone implements, and other objects have accumulated in the caves and have often been sealed up beneath deposits of calcium carbonate slowly accumulating on their floors. Relics of this kind, especially in certain parts of Europe, have revealed much concerning the life and culture of the times before the beginning of written history.

The following item taken from "The Pleistocene of North America and its Vertebrated Animals from the States East of the Mississippi River and from the Canadian Provinces East of Longitude 95°", by Oliver P. Hay, Carnegie Institution of Washington, Washington, D. C., pp. 34-35, 1923, records the finding of several bones of a prehistoric sloth in a cave in Greenbrier County:

"In a cave situated somewhere in this county were found the bones described in 1799 by President Thomas Jefferson (Trans. Amer. Philos. Soc., Vol. IV, pp. 246-260) under the name Megalonyx. Colonel John Stewart became interested and saved some of the bones from being carried away by curious inhabitants of the region.

"The bones, a distal end of a femur, a complete radius, a complete ulna, three claws, and some other foot-bones were secured and presented to the American Philosophical Society of Philadelphia, from which they passed into the possession of the Academy of Natural Sciences, where they are still preserved. Some of these were described by Dr. Caspar Wistar (Trans. Amer. Philos. Soc., Vol. IV, 1799, p. 526, plates I, II).

"Inasmuch as this species may have existed during a large part of the Pleistocene and certainly after the passing of the Wisconsin epoch, and inasmuch as no other species were found associated with the Megalonyx bones, it is impossible to say to what part of the Pleistocene that particular animal is to be assigned."

The late Andrew Price* states that he has proved to his own satisfaction that the bones were found in what is now known as Organ Cave in southern Greenbrier County. (See Maps I and II in Atlas).

Present Fauna in the Caves.—An interesting account of the life to be found in caves of the State is to be found in the Proceedings of the West Virginia Academy of Science, West Virginia University Bulletin, series 34, No. 15, pp. 39 to 53, 1934. In this paper Professor A. M. Reese, of the University Department of Biology, gives a detailed account of his visit to 43 caves. The following descriptions of the caves of Greenbrier County are taken from the paper just cited:

"**Organ Cave,** visited April 26, 1932.

"This, as has been said, is one of the few commercial caves of the State and is easily located by watching for the advertising signs along Route 24, (U. S. Route 219), in the lower side of the county near the Monroe County line. It is situated about one-half mile east of Route 24, (U. S. Route 219). The entrance is large and is at the base of a high, rocky cliff. The cave is partially lit by electricity. Some interesting formations are to be seen in this cave, also a number of wooden troughs, for collection of saltpeter, said to have been used during the war between the States. A considerable pond of water is here but at the time of our visit it was very cloudy and no animals could be found in it. No insects were seen. Several bats were collected, but were misplaced and so are not named here.

"The West Virginia Biological Expedition on July 30, 1931, found adults and larvae of the salamander, **Desmognathus fuscus fuscus.** This party also found **Rana clamitans** in the cave and **R. sylvatica** at the cave entrance, both probably accidental visitors."

On June 21, 1929, the senior author was shown through the cave by the manager, Mr. S. M. Sively. The cave, which is electrically lighted is in the Hillsdale member of the Greenbrier Limestone. Water that was colored for testing was found to emerge on Second Creek. In addition to the many interesting formations of dripstone, one of the main attractions to the visitor is the presence of 37 saltpeter hoppers used in making gunpowder by the Confederates in the Civil War. Of interest to the geologist is the fact that in this cave was found the bones of the Pleistocene Xenarthra **Megalonyx Jeffersonii,** named and described by President Jefferson in 1799.

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*Personal communication.

"**Rapp's Cave**, visited October 1, 1932.

"A dirt road leads northwest from Route 24, (U. S. Route 219), 3.5 miles north of Frankford; if this road be followed for one mile it will lead to the home of Mr. J. Rapp; the cave is about 200 yards behind and below the house, opening by a fairly large hole into the side of a steep hill. The rooms are fairly large but do not extend very far, perhaps 200 yards. The floor is very rough with fallen rocks; it was damp but no actual stream was present at time of visit. Considerable numbers of stalactites and other formations were present. No rats were found but three bats were collected, two Georgian, **Pipistrellus subflavus subflavus**, and one brown, **Myotis lucifugus**. The only other animals found were a few crickets, **H. subferraneus** Scudder."

"**Arbuckle's Cave**, visited October 1, 1932.

"This small cave is located one-half mile east of Route 24, (U. S. Route 219), in the rear of the brick residence of Dr. Arbuckle, at Maxwelton. Its fairly large opening is about 50 feet behind a small farm-house and leads into a roomy passage, with a smooth floor, that extends about 100 yards into a hill. The only actual water in the cave is a rocky tank, about 3 x 8 feet in size. The animals found were one Georgian bat, **Pipistrellus subflavus subflavus**; three salamanders, **Plethodon wehrlei**; many crickets, **H. subterraneus** Scudder; a few flies, **Amoebaleria defessa O. S.**; a few blind beetles, **Pseudanophthalmus grandis** Valentine; and one milliped, **Pseudotremia caverarum** Cope.

"**McClung's Cave**, visited October 1, 1932.

"This interesting cave is easily reached by following the road that leads from the east side of Route 24, (U. S. Route 219), at Maxwelton. About 2½ miles northeast of Maxwelton this road leads directly to the residence of Mr. McClung; the entrance to the cave is about 50 feet from the house. The cave which extends in a westerly direction passes almost directly beneath the house; its chambers are very roomy for a hundred feet or more, then contract to a high, narrow cleft with many fallen rocks. A considerable number of stalactites may be seen. Even in the extremely dry season, when the cave was visited, a small stream flowed towards the west, away from the entrance. The walking was difficult, and time allowed the cave to be followed for only 200 to 300 yards; but in this short distance the following animals were found: many crickets, **Hadenoecus subterraneus** Scudder; some diptera, **Amoebaleria defessa O. S.**; several blind beetles, **Pseudanophthalmus grandis** Valentine; several small gastropods, **Helicodiscus parallelus** Say; myriapods, four unidentifiable specimens; earthworms, **Helodrilus caliginosus trapezoides** Duges; several salamanders, **Eurycea lucifuga** and **Desmognathus fuscus fuscus**; no bats or rats were seen."

"**Saltpeter Cave No. 1**, visited April 26, 1932.

"This is one of the numerous caves known as saltpeter caves; it is located near the Tennant homestead at Blaker's Mill, between the Fort Spring road and the road from Alderson to Blue Sulphur Springs. The cave has a fairly large entrance but is not very extensive. Two or three bats, **Pipistrellus subflavus subflavus**; several crickets, **H. subterraneus** Scudder; and Diptera, **Amoebaleria defessa O. S.**, were collected."

"**Saltpeter Cave No. 2**, visited April 26, 1932.

"Located in the same hillside and about 100 yards from the preceding cave. It may be that the two caves are one. The cave was entered by climbing down a tree ladder into a large sink hole. One bat was seen, and some cave crickets, **H. subterraneus** Scudder, were found."

Bunger's Cave No. 1, visited April 26, 1932.

"This cave is about 1½ miles south of Route 60 (Midland Trail) about 8 miles west of Lewisburg. The road to this cave leaves Route 60 just east of the schoolhouse, close to the south side of Route 60. The entrance is large, rough and steep, with a stream about 50 yards from the opening. The cave can be followed only a short distance beyond the twilight zone. The only life found were three bats, two **Myotis lucifugus lucifugus**, and one **Pipistrellus subflavus subflavus**."

"**Bunger's Cave No. 2**, visited April 26, 1932.

"Located about one-half mile from the preceding cave at the side of a broad meadow. A wide, steep entrance ends, after about 50 feet, in a clear stream about 10 feet wide and 1 foot deep. This stream was waded for about 200 yards but no life of any sort was seen."

"'**Higginbotham's Cave No. 1**, visited June 24, 1932.

"This cave is located about one mile northwest of Frankford on the farm of Mr. O. D. Higginbotham, in the side of a hill. The main passages of the cave extend in opposite directions from the fairly large entrance and are high enough for erect walking in most places, so that it is an easy cave to explore. A slow-moving stream flows towards the south. Numerous stalactites are present. No bats or rats were seen. The animals found were: one salamander, **Plethodon cinereus** (dark phase); numerous crayfish, probably **Cambarus bartonii carinirostris** Hay; numerous cave crickets, **H. subterraneus** Scudder; numerous diptera, **Amoebaleria defessa** O. S.; and eight or ten blind beetles, **Pseudanophthalmus grandis** Valentine."

"**Higginbotham Cave No. 2**, visited June 24, 1932.

"This is a small cave, situated about one-half mile southwest of the preceding cave; its entrance is a sort of small sink-hole. No running water was present at the time it was visited. The only animals seen were many cave crickets, **H. subterraneus** Scudder, and two or three blind bettles, **Pseudanophthalmus grandis** Valentine."

"**Coffman's Cave**, visited June 24, 1933.

"This cave lies about one mile southwest of the preceding cave and 100 yards from the Coffman residence. The entrance is large and lies at the base of a rocky cliff. A good stream flows in the cave, in a direction away from the entrance, which has to be waded at places. lack of time and the appearance of a large pond stopped further investigation of this cave. The animals collected were: four salamanders, **Gyrinophilus porphyriticus**, (two larvae and two adults); a few crayfish, **Cambarus bartonii carinirostris** Hay; and many cave crickets, **H. subterraneus** Scudder. Numerous traps, set by Dr. Valentine for blind beetles, were seen in this cave, but no beetles were found."

"**Lizard Cave.**

"This cave is 1½ miles west of Alderson, on the road from Alderson to Hinton. It was not visited by the writer, but a specimen of **Eurycea lucifuga** was secured from the cave through Mr. R. H. Fletcher."

"**Mud Cave.**

"This is also on the road from Alderson to Blue Sulphur Springs, about 2½ miles from the preceding cave. It was not visited by the writer. A specimen of **Eurycea lucifuga** from the cave was received from Mr. Richard H. Fletcher."

"**Muddy Creek Cave.**

"This cave was not visited by the writer. It lies about one mile north of Alderson on the road to Blue Sulphur Springs. A specimen of **Eurycea lucifuga** from the cave was secured through Mr. Richard H. Fletcher."

Subsurface Drainage.—No tests were made by the Survey to determine the outlets of the various streams that sink into the limestone but the structural position of the rocks and field data suggest the following:

Stream	Probable Point of Emergence of Streams
Sinking Creek	Piercys Mill
Milligan Creek	0.6 mile N. W. of Fort Spring
Culverson Creek	Tributary to Spring Creek (?)
Roaring Creek	0.7 mile N. of Sunlight
Buckeye Creek	Tributary to Spring Creek (?)

From a structural standpoint it is possible that Culverson Creek and Buckeye Creek flow southwest on their subsurface course and emerge either on Mill Creek or near Fort Spring.

PART II.

Geology.

CHAPTER III.

GEOLOGIC PROCESSES: EROSION AND DEPOSITION.

Hills and Valleys are Temporary Features. — When we look at the hills and valleys of our State, and think of the fact that the first inhabitants of this region, probably several thousand years ago, saw the same hills and valleys practically as they are to-day, it is hard to realize that they are, after all, quite temporary features—that there was a time in the earth's history before they existed, and that in the future they must surely vanish. Yet, whenever we see a stream flowing turbid with suspended matter after a rain, we have before us the process through which the valleys were made, leaving the hills as temporary remnants of the formerly continuous beds of rocks. And by this one process the hills too will, in time, be worn away and the materials of which they are composed carried seaward, finally to rest, in the case of material from most of our State, in the growing delta at the mouth of the Mississippi.

Weathering is a process of physical and chemical change which goes on whenever rocks are exposed to air, moisture, and changes of temperature. The active agents contained in air—oxygen and carbon dioxide—attack certain compounds present in many rocks and change them to other compounds, some of which are more easily removed by water than were

the original substances. Water permeating the pores of rocks dissolves and removes any soluble substance originally present, as well as those formed by the chemical action of oxygen or carbon dioxide. Thus, the grains of substances neither subject to chemical change nor appreciably soluble in water are separated from one another in so finely divided a state that running water can easily carry them away. Sand, for example, is formed in this way from granites and from sandstones. The sand grains originally present in these rocks are simply left separated one from another through the removal of the other materials that, with the sand grains, compose such rocks.

Effects of Changes of Temperature.—Changes of temperature, especially in the Temperate Zones, are very active in breaking rocks to pieces, thus exposing fresh surfaces to the action of air and water. All substances change in volume with changes of temperature, and the change is nearly invariably expansion with rise in temperature. Since each of the several minerals of which rocks are composed has its own rate of change of volume with temperature, the result of considerable temperature change in a mass of rock is generally a weakening of the adhesion of unlike minerals to one another.

Another powerful disintegrating agent is the freezing of water which has been absorbed into the pores of the rock. As is well known, when water freezes the volume change is a decided **expansion.** Just as water freezing in pipes bursts them, so freezing in crevices of rocks pushes the pieces farther apart, while the freezing in the very small pores within the rock tends to break down the entire mass into a pile of mineral fragments. In this area we do not see piles of minerals so produced because abundant rainfall carries away the products of disintegration as fast as they are produced.

The Processes of Erosion and Deposition Never Cease.—The processes of the removal of material from the higher portions of the earth's surface and its deposition in lower places go on continuously, never ceasing, and have so continued

throughout the millions of years of geological history. There is no area of the earth's surface that remains quite unaffected by these processes for any considerable length of time. How is it then, that the higher parts of the earth have not, long ago, been worn away entirely? Since the oceanic basins are larger than the land areas, to have this cycle go on to completion would mean that the earth would be entirely covered with water. This would certainly have happened long ago if the outer zone of the earth, (which we call the "crust" of the earth, because it was once thought that all of the earth within this zone was liquid), were stationary. Just as surely as these weathering processes with the aid of running water are trying to remove the irregularities of the surface of the earth internal processes or forces are tending to prevent it. We know that vast masses of this outer zone of the earth have moved upward even as far as several miles, while other masses have sunk downward. This fact is not so immediately evident as is that of the erosion processes just stated. Remains of sea animals, shells, corals, teeth and spines of marine fishes are found in many beds of rock now thousands of feet above sea-level. As a matter of fact all of these have been found in the rocks of Greenbrier County. The Greenbrier Limestone which is so conspicuous along the Greenbrier Valley contains literally millions of beautifully preserved marine shells and corals, while in the western part of the county fossil fish teeth are found a few feet above the Sewell Coal.

The processes of sinking and of elevation have actually been observed in many parts of the world. For hundreds of years parts of Denmark and Sweden have been slowly rising. On the other hand a part of the coast of Greenland has been sinking at the rate of several feet a century since the first settlement of that coast by Europeans.

Not only are portions of the outer zone of the earth elevated or depressed, but they are often times deformed into large or small arches, such as may be seen in the county (Alvon) and particularly in Pendleton and other counties of the Eastern Panhandle. Sometimes the stress on the beds of rock has been so great that they have broken, and the masses

opposite the fracture have slid past one another. Since we will frequently have occasion to speak of the features just mentioned these terms will be defined here:

Anticline.—A fold that is arched upward or convex upward. The oldest beds are in the middle.

Syncline.—A fold that is arched downward or convex downward. The youngest rocks are in the middle.

Fault.—A fracture or break along which there has been movement. The masses on opposite sides have moved past one another.

It can be seen that while a land area remains, as a whole, higher than the surrounding districts, not only will no new deposits (except volcanic) be laid down upon it, but the deposits already present will be continuously worn away. Now, the area of the State has, for a very long time, remained at least as high as any neighboring region. For this reason no very young rocks are found in Greenbrier County, or even in West Virginia, and many of the older rocks have been removed in places.

Classification of Rocks.—The rocks of the earth's crust fall into three main groups:—**igneous, metamorphic,** and **sedimentary. Igneous** rocks are those that have solidified from a molten magma. **Metamorphic** rocks are those that have been subjected to such intense heat and pressure that their physical and chemical properties have been changed. **Sedimentary** rocks are made up of the transported products of decomposition of older rocks or of organic material.

It is important to remember that **all** of the outcropping rocks in Greenbrier County are **sedimentary** rocks.

How Sediments Change to Stone.—As sediment is deposited, whether under water or on land, the lower beds become subject to an ever increasing pressure, due to the weight of the sediments that are constantly being laid down upon these lower beds. This slowly forces the particles of which the lower beds are composed closer together, besides flattening all particles of softer material. As the depth to which the lower beds are buried increases with deposition of new sediment, the temperature to which they are subjected also rises steadily. Thus, if a thickness of two miles of sediment

is deposited, the temperature of the basal beds will be about 175 to 200° Fahrenheit. The pressure under the same thickness of sediments of average density will be in the neighborhood of 10,000 pounds per square inch. It must be remembered that beds of sediment are subjected to such pressures and temperatures, not for periods of time as we are well able to comprehend, but for periods of hundreds of thousands and millions of years. Under these conditions beds of soft clay and silt are changed into compact shales.

However, pressure and moderate heat alone are entirely ineffective in changing beds of reasonably pure quartz sand to solid sandstone. This takes place only through the deposition of some kind of cementing material,—usually from circulating water,—among the sand grains. The more important of these cementing materials are **calcium carbonate, ferric oxide, and silica.** Calcium carbonate ($CaCO_3$), is the chief constituent in ordinary limestone and is soluble in slightly acid water. Ferric oxide (Fe_2O_3) is more familiar to us as iron rust ($Fe_2O_3.nH_2O$) and when found in large quantities the minerals, limonite ($Fe_2O_3.nH_2O$) and hematite (Fe_2O_3) are valuable iron ores. Silica (SiO_2) is simply the material (quartz) of the grains themselves. Although practically insoluble in cold water it is soluble in hot water which already has certain substances in solution.

Limestone may be deposited as a mass of shell fragments, as a fine-grained lime mud, or as a mixture of these components. In either case it is readily and rapidly consolidated through formation of crystals of calcite, and through the effect of high pressure.

The Sedimentary Rocks. All rocks thus formed through compaction and cementation of sediments under conditions of moderate temperatures and comparatively moderate pressures are called **sedimentary rocks**. The main classes into which they are divided are as follows:

Conglomerates are sedimentary rocks composed largely of pebbles and boulders, that is, of fragments larger than coarse sand grains. But if a large proportion of the fragments are

sharp-edged, the rock is usually called, **a breccia,** not a conglomerate. The cementing material of either conglomerate or breccia is usually calcium carbonate or ferric oxide.

Sandstone is composed essentially of grains of quartz sand. Most sandstones contain smaller quantities of several other minerals such as magnetite (magnetic iron ore) and mica. Sandstone is described as coarse, medium, or fine grained, according to the prevailing size of the sand grains of which it is composed. The varying colors of sandstones are due to the cementing materials and to minor constituents, since pure quartz sand is white or transparent.

Shales are composed of compacted, finely divided sediment, and usually contain a high proportion of clay. Unlike sandstones and conglomerates, they do not require the presence of cementing material. They are the softest of ordinary sedimentary rocks, and disintegrate more rapidly through weathering than any of the others. Some shales are popularly known as "slate," especially in the coal mining districts. True slate, though formed from shale, is quite different and results from more intense pressure and heat.

Limestone consists essentially of calcium carbonate. In addition, however, all limestones contain varying, though frequently small, proportions of other minerals. They are harder than shales and, when well compacted, are among the toughest and strongest of sedimentary rocks. As calcium carbonate is somewhat soluble in water, especially if the latter contains a trace of any acid, limestone is removed directly by running water, without previous weathering. This process of removal of limestone by **solution,** when carried on by underground water, results in the production of the caves and sinks that are so common in thick limestones. A limestone-like rock, which contains, besides calcium carbonate, a considerable percentage of magnesium carbonate, is called a **dolomite.** With a smaller percentage of magnesium carbonate, it is called a dolomitic limestone.

Coal is a term applied to vegetable matter with varying amounts of mineral matter and with or without small pro-

portions of animal matter which through geological processes has become so changed by loss of volatile matter that it is more or less compact and dark in color. It burns with comparative slowness and decomposes slightly in the atmosphere. It has a variable chemical composition and is not homogeneous. It grades into peat and differs from that substance in composition chiefly in the smaller percentage of water, oxygen, and volatile hydrocarbons.

A few descriptive terms that will be used frequently in the volume will be defined here:

Arenaceous, from Latin **arena**—sand; meaning **sandy,** or composed largely of sand.

Argillaceous, from Latin argilla—white clay; meaning composed largely of clay.

Calcareous from Latin **calx**—limestone; meaning composed largely of calcium carbonate.

Sedimenary rocks, though often occurring as described above, are probably found more often of intermediate composition. Thus a rock may be formed of a mixture of the finely divided particles of which shale is composed, with calcium carbonate. If the latter appear to predominate, the rock is called an **argillaceous limestone.** In the same way, a rock composed of a mixture of sand and calcium carbonate is an **arenaceous limestone** if the main constituent is calcium carbonate; but if it is composed mainly of sand grains it is called a **calcareous sandstone.** So too, a rock made up of shale particles and sand grains is an **arenaceous shale,** or an **argillaceous sandstone,** depending on which constituent predominates.

Derivation of Sediments and Implied Environment.—As stated above, all of the outcropping rocks of Greenbrier County are of sedimentary origin. They consist of sandstone, shale, and limestone of great variety in composition and appearance. These materials were originally gravel, sand, and mud, derived from the decomposition of older rocks, chemical precipitates, and the remains of plants and animals that lived in the seas or swamps while the strata were being deposited.

The rocks reveal the unwritten history of the sedimentation from the early Silurian to middle Pottsville time. From their composition, appearance, and fossil content a great deal

can be inferred as to the conditions under which they were deposited. For example, rocks marked by ripples, cross-bedded by currents, or cracked by drying on mud-flats, indicate shallow water, while certain fossils indicate marine water and others indicate fresh or brackish water.

Not only can the condition of sedimentation be determined but also the character of the adjacent land. The sand and pebbles of coarse sandstone and conglomerate show that the adjoining land may have been high and the stream gradient steep. Red beds are generally indicative of continental deposits in an arid climate. Limestones are indicative of clear water and if shallow water is also indicated the adjacent land must be low and the streams too sluggish to carry off the coarser sediments.

If we could reproduce the physical environment found at the beginning of the deposition of our sedimentary rocks, which is roughly estimated at 500,000,000 years ago, we would find that the area now occupied by West Virginia was covered with a sea which extended from the Gulf of Mexico on the south to Newfoundland on the north. To the east was a rugged and mountainous continent composed of crystalline (igneous and metamorphic) rocks. This continent roughly paralleled what is now the Atlantic coast. It was from this region that the greater part of the sedimentary rocks now found in West Virginia was derived. The area occupied by this sea was a zone of weakness and was, on the whole, a subsiding basin, in part due to the weight of the accumulating sediments, up to the close of the deposition of the youngest sediments found in the State. During this time minor oscillations caused the withdrawal of marine waters, at times more or less completely. On the whole, however, the area was one of subsidence so that during its history sediments several miles in thickness were accumulated. Generally speaking the water was comparatively shallow and not comparable to our present ocean depths.

The oldest rocks exposed in Greenbrier County are of the Red Medina Series. These rocks outcrop along the west side of Beaver Lick Mountain from the Pocahontas County line southward for about three and one-half miles. The interbedded

sandy shales and shaly sandstones are apparently non-fossiliferous and, as emphasized by their red color, indicate deposition under subaerial conditions. The overlying White Medina (Clinch, Tuscarora) is a dense quartzite, in Greenbrier County, but from its appearance in other counties of the State it is believed to have been deposited in marine waters. The Clinton is poorly exposed in this county but thin limestones in the upper part and scattered fossils indicate that it is at least partly of marine origin. The remaining Silurian beds,—Niagara, Rondout, and Bossardville,—reveal a vast assemblage of marine forms.

It is apparent that Silurian time was one of encroaching seas and that during this period the cycle of erosion of the ancient land mass to the east was nearly completed.

The Lower Devonian, next above the Silurian, is abundantly fossiliferous and the environment was quite similar to that prevailing in upper Silurian. The limestones and cherts indicate clear water while the sandstones that occur in the upper part are well sorted and usually quite pure. These sandstones were derived from the east and indicate that the ancient continent was slowly being uplifted.

The Middle Devonian in Greenbrier County is largely black shale. The origin of black shale is still the subject of much debate. However in this county fossils show that marine conditions prevailed for at least a part of Middle Devonian time.

From the bottom to the top of the Upper Devonian the sediments become more and more coarse and the sandstones become more and more massive. The older part (Portage) is only sparingly fossiliferous with both marine and plant fossils. The Chemung coming above the Portage is abundantly fossiliferous with a large assemblage of marine forms. At the top of the Upper Devonian (Catskill) is a succession of red shales with enclosed conglomerates that sometimes reveal plant fossils. These red shales are continental deposits and do not extend over the entire county.

As indicated above, at the start of Devonian time the ancient land to the east was low and the seas clear. Uplift of the land started near the close of Lower Devonian time and

in Marcellus time the seas became turbid as indicated by the predominance of shale. That the eastern land mass continued to rise during Devonian time is shown by the material composing each succeeding group of rocks. From the beginning to the end of this period there is a more or less gradual change from limestone to coarse sandstones and shales, from wholly marine beds to interbedded marine and non-marine beds with red non-marine beds at the top. The direction of the source of the sediments throughout all of Devonian time appears to have been to the northeast of Greenbrier County.

Overlying the Catskill is about 600 feet of sandstones and sandy shales of Mississippian age that are partly of marine and partly of non-marine origin. These beds correlate with the Pocono Series and appear to be the equivalent of the Price Formation of Virginia. The red Maccrady shales and thin sandstones are next above and as both the Pocono and Maccrady thicken to the southeast the source of the material composing them is assumed to lie in the same direction. Thin lenticular coals in the Pocono indicate a moderate climate.

The source of the detrital material in the Greenbrier limestones is not known but the abundance of marine shells and corals speak eloquently of quiet marine environment and moderate temperatures. Likewise the exact source of the clastic material in the overlying Mauch Chunk Series has not been worked out. However, it is safe to say that the ultimate source of most of the material was the land mass to the east. The Mauch Chunk is composed of red shales and sandstones and some marine limestones with the marine beds occurring less often near the top. Thin coal seams scattered through the middle of this series indicate a generally mild temperature.

The Pottsville Series rests unconformably on the Mauch Chunk with the change quite abrupt from red shales to dark sandy shales and sandstones. Only the lower and middle groups of the Pottsville remain in Greenbrier County, the upper group and all younger rocks of the Paleozoic having been removed by erosion. No distinctly marine fossils have been found in the Pottsville of this area and numerous coal beds testify to a subaerial environment with abundant plant life. From any given point in the county this series thins

rapidly to the north and northwest, due both to absence of members from the base and thinning between coal seams. Historical geologists, noting the rapid thickening of Pottsville rocks to the south have ignored much evidence to the contrary and postulated a source for the material in that direction. It is the junior author's belief that the bulk of the material making up these rocks came from some point to the northeast of Greenbrier County and that the rate of subsidence of the filling basin controlled the thickness of the formations. Erosion of the Mauch Chunk shales from the central part of the State may have contributed some detritus, especially in the lower part of the series. This conclusion is based on a study of the unconformity and on the size and distribution of the pebbles, sand, etc., across the northwest part of the county.

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Nomenclature and Correlation.—In Greenbrier County, the problem of proper nomenclature, along with accurate correlations, involves a selection from equivalent titles that have been given the same formations in different regions. In the present instance this discrimination must be made from the published columns and generally accepted terms in the respective localities of the surveys that have been made in adjoining areas, and in part the local area. These are principally the State Surveys of New York, Pennsylvania, and subsequent eastern States; those of Virginia and other southern Appalachian States; those of the general Mississippi Valley; the U. S. Geological Survey; and more especially the column of the West Virginia Geological Survey. Fortunately, general revision is unnecessary, but early deductions must be affirmed, while many of the local names must be considered as such, so that original titles of which there is no longer a doubt may be properly applied.

In this report as in all the West Virginia Geological Survey reports an attempt is made to recognize and follow the earliest nomenclature of authentic publications that have had general circulation and are of sufficient detail to follow.

In the Pennsylvanian Period the amplified Pottsville nomenclature of southern West Virginia, as used in numerous reports of the West Virginia Geological Survey, is employed.

In the Mississippian Period it is necessary to choose between the distinct nomenclatures of the East and the West. In this Period four major series are easily recognized. Particularly is this true in southern West Virginia, where, until the last few years, detailed study, with subdivisions of the four series, had not been made. In the Mercer, Monroe, and

Summers County Report, however, Reger's careful and detailed study established the relationship of these rocks to those of the East and the West. Because of the close proximity and similarity of conditions the same nomenclature is herein retained so far as applicable. It is true that even in this short distance considerable thinning has occurred but the same major groups have carried through the entire county.

In the Devonian and Silurian it has been the policy of the West Virginia Geological Survey to retain the New York nomenclature where possible. Many of the important subdivisions, although somewhat attenuated, are easily recognized across the State.

In Chapters VI to IX, inclusive, where the various subdivisions are discussed in detail, the nomenclature of several organizations and authors is included, together with that adopted in this report, which should serve to harmonize conflicting names.

Classification of Outcropping Rocks.—Figure 7 is a general columnar section of the outcropping rocks of Greenbrier County, indicating the maximum and minimum thicknesses of all subdivisions of sufficient importance to be mapped geologically, followed by a brief description of their most salient features. Further descriptions and subdivisions are included under the discussions of each series in Chapters VI to IX, inclusive.

FIGURE 7

GENERAL COLUMNAR SECTION OF ROCKS EXPOSED IN GREENBRIER COUNTY

VERTICAL SCALE: 1 INCH=1000 FEET

ERA	PERIOD OR SYSTEM	SERIES		MAP SYM.	SECTION	THICK. FEET	TOTAL FEET	DESCRIPTION
QUAT.	RECENT			QAL		?	?	*Unconsolidated clays and gravel. (River wash)*
QUAT.	PLEISTOCENE			QAL		?	?	*Unconsolidated clays and gravel. (River terraces)*
PALEOZOIC	UPPER CARBONIFEROUS PENNSYLVANIAN	POTTSVILLE	KANAWHA GROUP (PART)	Ck		250±	250	*Massive gray sandstones; gray sandy and dark carbonaceous shales; coals; fresh or brackish water fauna; plant fossils.*
			NEW RIVER GROUP	Cnr		600-950	1200	*Massive gray sandstones; gray sandy and dark carbonaceous shales, minable coals; fresh or brackish water fauna; erratic boulders in Sewell Coal; plant fossils.*
			POCAHONTAS GROUP	Cp		0-340	1540	*Massive gray sandstones; gray sandy and dark carbonaceous shales; minable coals; fresh or brackish water fauna; plant fossils.*
	LOWER CARBONIFEROUS MISSISSIPPIAN	MAUCH CHUNK	BLUESTONE GROUP	Cbl		80-675	2215	*Red, green and variegated shales; green, gray and brown massive and flaggy sandstones; thin streaks of coal; marine fauna and plant fossils.*
			PRINCETON CONGLOM.	Cpr		20-80	2295	*Massive gray and brown sandstone with variegated pebbles; poorly sorted; plant fossils.*
			HINTON GROUP	Chn		500-850	3145	*Red, green and variegated sandy shales; thin limestones; red and brown sandstones; massive sandstone at base (Stony Gap); marine and plant fossils.*
			BLUEFIELD GROUP	Cbf		1000-1200	4345	*Brown, red, green, variegated argillaceous, calcareous and fissile shales; massive and flaggy sandstones; limestones in lower part; coal streaks; abundant marine fauna; some plant fossils.*
		GREENBRIER		Cgr		475-750	5095	*Dark gray, massive limestone; thin streaks of calcareous shale; white oolite 100± feet from top; streaks of red shale or limestone below middle; lower portion cherty; abundant marine fossils.*

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FIGURE 7

GENERAL COLUMNAR SECTION (CONTINUED)

ERA	PERIOD OR SYSTEM	SERIES	MAP SYM.	SECTION	THICK. FEET	TOTAL FEET	DESCRIPTION
PALEOZOIC (CONTINUED)	LOWER CARB. MISSISSIPPIAN (CONTINUED)	MACCRADY	Cmcc		60–250	5345	*Deep red, purple shale; occasional sandstone.*
		POCONO	Cpo		200–600	5945	*Brown or red cross-bedded sandstone; conglomerate at top and base; sandy shale; lenticular beds of semi-anthracite coal; numerous marine fossils and land plant fos*
	UPPER DEVONIAN	CATSKILL	Dck		0–400	6345	*Mostly red shale and sandstone; some brown shale; marine fauna and plant fossils.*
		CHEMUNG	Dch		2000–3000	9345	*Gray, green, brown, massive and flaggy sandstone, interbedded with gray, green arenaceous and argillaceous shale; sandstone conglomerate at top (Hendricks); abundant marine fossils; some land plant fossils.*

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FIGURE 7

GENERAL COLUMNAR SECTION (CONCLUDED)

ERA	PERIOD OR SYSTEM	SERIES	MAP SYM.	SECTION	THICK. FEET	TOTAL FEET	DESCRIPTION
PALEOZOIC (CONTINUED)	UPPER DEVONIAN (CONTINUED)	PORTAGE	D*p*		2000±	11345	*Gray, green, sandy and argillaceous shale interbedded with grayish green and brown flaggy sandstone; sparse marine fauna; land plants.*
		GENESEE	D*g*		50–100	11445	*Brown to black slaty shale; marine fauna.*
	MID. DEV.	(HAMILTON) MARCELLUS	D*m*		500±	11945	*Black carbonaceous, fissile slickensided shale; thin limestone in lower portion; septaria; marine fauna.*
	LOWER DEVON.	ORISKANY	D*o*		80–90	12035	*Upper part, light to dark calcareous chert; gray to brown ferruginous sandstone; marine fossils.*
		HELDER-BERG	D*hl*		300±	12335	*Massive, blue, tough, cobbly limestone; chert nodules; marine fauna.*
	SILURIAN	BOSSARD-VILLE	S*bo*		250±	12585	*Blue to gray, massive to platy ls. calcite streaks; marine fauna.*
		RONDOUT	S*rd*		200±	12785	*Flaggy, brittle limestone; sparse marine fauna.*
		NIAGARA	S*na*		100±	12885	*Massive, dark gray limestone; geodes; marine fauna.*
		CLINTON	S*cl*		600±	13485	*Massive, gray, quartzitic sandstone at top; thin limestones in upper part; variegated shale near middle; massive gray and red (iron ore) ss. near base; marine fossil*
		WHITE MEDINA	S*wm*		100±	13585	*Massive, white, very hard quartzite, Scolithus and fucoids.*
		RED MEDINA	S*rm*		800±	14385	*Deep red shale alternating with red and reddish-brown sandstone; no fossils found.*

J.P.N.

CHAPTER IV.

Structural Geology.

INTRODUCTION.

In order to appreciate the structural geology of Greenbrier County it is necessary to analyze it in its general position and relationship with the surrounding areas. It must be kept in mind that the county has received its proportionate share of the disturbances that have affected the Appalachian area in general. By its structure is meant the position in which the strata are now found;—their position or deviation from the horizontal, the approximate position in which they were originally deposited.

Preceding discussion has shown us that the sediments were deposited on the floor of a shallow sea, the bottom of which slowly sank to permit the accumulation of thousands of feet of muds, sands, and limes. However, all those buried for any considerable depth had been compacted into their consolidated equivalents, shales, sandstones, and limestones.

These rocks were then subjected to tremendous earth stresses. These stresses were coming from the east and southeast and were of mountain-making proportions. The geologic time was during the latter part of the Permo-Carboniferous Period. The forces were of sufficient magnitude to move the ancient crystalline mountains, on the east, bodily westward so as to squeeze these sediments which had been deposited in the sedimentary trough into many elongated folds. This tangential or compressive stress tended not only to fold or buckle the rocks but mash and telescope them in such a way that they were thickened en masse and raised from beneath the sea. This episode in geological history is known as the Appalachian Revolution and accounts for the folding of our present Ap-

palachians. It does not, however, account for their present height, as the exposed sediments were immediately attacked by weathering agencies which would have reduced them to sea-level instead of a fairly even-crested plain during the course of the vast lapse of time that followed, had not the entire area again been subjected to earth stresses of mountain-making proportions. This time, however, the stresses operated vertically rather than horizontally, as had the previous example, and are responsible for the greater part of our present elevation. It is true that the entire area has since been subjected to one more rejuvenation, but of less magnitude than either of the preceding movements. The present topography is the result of the interaction of these forces with the atmosphere or weathering agents.

METHODS OF GEOLOGIC WORK AND REPRESENTATION OF STRUCTURE.

The method of determining the structure, or position of the rocks in Greenbrier County was not the same in all parts of the county. In the western part of the county where the rocks have been only slightly disturbed and where the strata are still practically horizontal, there are some well-defined beds, where it is possible to measure thicknesses and determine dips over fairly wide areas, by means of aneroid barometer levels, with considerable accuracy.

In this region a structure map has been made, showing the position of the base of the Sewell Coal of the New River Group of the Pottsville Series in the region where this coal occurs. This area includes the Meadow Creek and Big Clear Creek commercial fields where many elevations are available. That portion of the Cherry River drainage in Greenbrier County, including the North and South Forks, is practically uninhabited. Second-growth timber is in part about large enough to cut again. Travel is with difficulty and must be made on foot. Under these conditions and with very little prospecting, information on the coal is only slight. However, other key horizons from which the approximate interval to the Sewell Coal is known have been used to show the base of this coal. In the southwestern part of the county where the

Sewell Coal is gone, underlying coals are present in which the approximate interval to the Sewell Coal is known. In this way the position of the key horizon (Sewell Coal) can fairly accurately be determined, whether it is below drainage or whether it has been removed from the tops of the hills.

The detailed work necessary to prepare the structure map included several hundred observations on the key horizon and other known stratigraphic horizons. Elevations were obtained either by aneroid barometer, checked on the nearest Government spirit-level determination as recorded on the topographic maps, or from spirit-level determinations furnished by engineering departments of several operating companies.

In Greenbrier County there is considerable variation in the intervals between the different stratigraphic horizons due to the thickening or thinning of the intervening measures. For this reason it must not be assumed that the structure on other horizons conforms exactly to that of the key horizon (Sewell Coal). In order to better determine the position of other beds, a table of intervals was prepared from numerous detailed stratigraphic cross-sections and measurements of intervals from place to place. The principal results of these data are condensed in the following table which shows the intervals above and below the Sewell Coal. These tables were used in determining the contours on the key horizon in localities where direct observations could not be made:

Intervals Above and Below Sewell Coal, Greenbrier County.

	Anjean	Big Clear Creek Mountain	Boggs Knob (Sims Station)	Charmco	Cross Mountain	Duo	Grassy Knob	Manning Knob	Namo Chapel (Jetsville)	N. F. Cherry River at County Line	Quinwood	Russellville	S. F. Cherry River at County Line	Sugartree Bench (Briery Knob)
Upper Nuttall Sandstone (top)	......	......	......	......	......	510	......	......	......	450	490	......	......	......
Hughes Ferry Coal	......	......	......	......	......	290	......	......	......	250	280	270	250	......
Castle Coal	110	100	......	......	......	150	......	......	90	85	120	120	90	100
Sewell Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Little Raleigh Coal	160	150	140	140	170	155	140	140	140	120	130	140	100	120
Beckley Coal	265	270	240	250	280	250	270	250	215	190	250	250	160	225
Fire Creek Coal	325	330	325	320	365	340	350	325	260	235	305	340	200	300
No. 8 Pocahontas Coal	430	425	450	435	450	450	450	420	......	......	......	420	......	360
No. 6 Pocahontas Coal	525	530	500	500	540	525	540	490	......	......	......	500	......	?
No. 3 Pocahontas Coal	635	625	600	600	650	615	640	?	......	......	......	......	......	......
Base of Pottsville	660	740	660	750	750	650	720	550	400	300	......	......	220	550
Princeton Sandstone (top)	835	1050	940	......	1075	......	1165	900	550	440	......	......	320	930

For the remainder of the county, or the central and eastern side, where the rocks have suffered greater deformation, different methods of stratigraphic work are necessary. In a large part of this area the rocks have been severely deformed, leaving them tilted, vertical, occasionally overturned, and sometimes faulted. In such areas the aneroid and level are of minor importance, but the combination clinometer and pocket transit takes their place. With this instrument numerous dip and strike readings were taken, most of which are shown on Map II (in Atlas). By using the accurate topographic maps many cross-sections across the dip were made, and accurate contact lines of the different series were mapped. Four cross-sections have been plotted to a scale of 1:62,500 both horizontally and vertically and appear on the upper right corner of Map II. In other localities, where conditions were favorable, horizontal measurements were made across the dips to secure data for compilation of thickness by trigonometric formulae, and the resulting sections, along with those vertically measured in the western half of the county, appear in Chapter V under the heading of "Measured Sections."

DETAILED STRUCTURE.

ANTICLINES AND SYNCLINES.

Webster Springs Anticline.—The Webster Springs Anticline of Reger[1] has been traced from northern Webster County, across the eastern edge of Nicholas County to the Greenbrier County line about 3½ miles northeast of Richwood. Along the crest of the fold at the county line the Sewell Coal has an elevation of about 3175 feet. Along the crest southwestward there is a gradual rise of almost 100 feet to the mile and at the high point along the fold, one mile south of Mann Knob, the Sewell Coal has an elevation of about 3725 feet. From this point the fold trends a little more to the west passing just south of Beech Knob and pitches at the rate of about 30 feet to the mile. From this point the axis of the anticline gradually bends more and more toward the south, and near the headwaters of Sam Creek there is a structural saddle with the ele-

[1] Reger, David B., Webster County, W. Va. Geol. Sur., pp. 60-1, 1920.

vation of the Sewell Coal being 3485 feet. South from this point along the crest of the fold the elevation of the coal again rises and at the high point on north Pollock Mountain the elevation of the Sewell Coal is slightly over 3550 feet. South from this point the fold pitches at the rate of about 50 feet to the mile. The anticline and the Kovan Syncline come together and disappear about one mile north of Anjean. As indicated there is a dome with a closure of approximately 100 feet between Anjean and the headwaters of Sam Creek.

Correspondence with Mr. W. W. Coleman, Chief Engineer of the Leckie Smokeless Coal Company, indicates that the elevations for mine openings 92, 93, 94, 95, and 96, as used in making the structure map are each 17.57 feet too high. The net result of this error is to shift the closed 3500-contour northeast until it passes between mines 92 and 93 instead of between 93 and 94. The 3450-contour should be moved east with a rather sharp bend, passing between mines 94 and 95 and back between 95 anl 96. The other contours are not materially affected.

The Webster Springs Anticline has a length, in Greenbrier County, of 18 miles and throughout its length it is asymmetrical, the dip being greater on the west side than on the east. The surface rocks along the crest of the anticline in Greenbrier County are mostly the New River Group of the Pottsville Series with the Bluestone, Princeton, and Hinton Groups of the Mauch Chunk Series coming to the surface along the North Fork of Cherry, South Fork of Cherry, Little Laurel Creek, and Big Laurel Creek.

Kovan Syncline.—The Kovan Syncline of Reger[2] roughly parallels the Webster Springs Anticline and has been traced from its northern end, near Hodam, Webster County, to the Greenbrier County line ½ mile east of the common corner of Webster, Nicholas, and Greenbrier Counties. The axis of the syncline crosses the North Fork of Cherry River between Coats Run and Little Lick Run, turns a little more south to the mouth of Beech Lick Run on the South Fork of Cherry River, follows along the river to the mouth of Mill Run, turns more to the

[2]Reger, D. B., op. cit. pp. 61-2.

west to cross Big Mountain one mile northwest of Manning Knob, crosses Beech Ridge one mile northwest of Clearco, passes just west of Duo and follows the west side of Big Clear Creek to disappear on the south end of Pollock Mountain, about one mile north of Anjean.

The Kovan Syncline is a very shallow fold with the elevation of the key bed along its axis rarely 100 feet lower than it is along the axis of the Webster Springs Anticline. Along the axis of the syncline at the county line the Sewell Coal has an elevation of a little less than 3100 feet, gradually rises to an elevation of about 3710 feet 1½ miles south of Mann Knob. From this point southwestward along the axis the elevation declines to a low point just west of Duo where the Sewell Coal is about 3420 feet. From Duo to the south end of Pollock Mountain, where the syncline disappears, the elevation of the Sewell Coal rises about 40 feet.

The outcropping rocks along the syncline are mostly the New River Group of the Pottsville Series with the Mauch Chunk at the surface along the valleys of North and South Forks of Cherry River, and on Big and Little Laurel Creeks.

Boggs Knob Anticline.—The Boggs Knob Anticline of Hennen[3] received its name from a knob of the same name in western Greenbrier County. It has been traced west and south from that point to its southern termination in Summers County, three miles northwest of Hinton. It is a very shallow fold with a reversal of less than 100 feet. The close similarity of this fold to the Webster Springs Anticline, described above, led to an attempt to prove that both were part of the same anticline. All field evidence refutes such an idea and as shown on Map II the Boggs Knob Anticline disappears near the southern end of Goddard Mountain.

The surface rocks along the two miles of the anticline in Greenbrier County belong to the New River and Pocahontas Groups of the Pottsville Series and to the Bluestone and Princeton Groups of the Mauch Chunk Series.

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[3] Hennen, Ray V., Fayette County, W. Va. Geol. Sur.: pp. 94-5, 1919.

Springdale Syncline.—The Springdale Syncline of Hennen[4] roughly parallels the Boggs Knob Anticline and the surface rocks belong in the Pocahontas Group of the Pottsville Series and in the Bluestone Group of the Mauch Chunk Series. With a length of less than two miles in the county the syncline dies out just south of Goddard Mountain. The exact location of the axis of the syncline is difficult to find but its probable location is shown on Map II, being about two miles southeast of the crest of the Boggs Knob Anticline.

Alderson Anticline.—The Alderson Anticline of Reger[5] has been traced from Summers County, across the western corner of Monroe County, to the city of Alderson at the Greenbrier County line. Extending through Alderson, from which the fold derives its name, the anticline has been traced to its northern end near Muddy Creek Church. Throughout the four miles of the fold in Greenbrier County the surface rocks are the limestones of the Greenbrier Series.

Creamery Syncline.—The Creamery Syncline of Reger[6], roughly parallels the Alderson Anticline. Starting in Summers County, one mile southeast of Bargers Springs it extends northeastward into Monroe County, passes just east of the village of Creamery, from which it is named, and reaches the Greenbrier County line about ½ mile east of Alderson. From the county line it extends northeastward to Blaker Mills and disappears about 1½ miles north of that village.

The surface rocks along the axis of the syncline in Greenbrier County belong to the basal part of the Mauch Chunk Series and the upper part of the Greenbrier Series.

Williamsburg (Mount Pleasant) Anticline.—The Mount Pleasant Anticline of Reger[7] has been described as a weak fold starting 1½ miles northeast of Wolf Creek Post-Office, extending northward and passing just east of Mt. Pleasant School, reaching the Greenbrier County line 1½ miles east of Alderson,

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[4]Op. cit., p. 95.
[5]Reger, David B., Mercer, Monroe, and Summers Counties, W. Va. Geol. Sur.; p. 149, 1926.
[6]Op. cit., pp. 149-150.
[7]Op. cit., pp. 150-1.

its total length in Monroe County being 4 miles. The Williamsburg Anticline of this report, although apparently connecting with the Mount Pleasant Anticline, has been renamed because of its much greater magnitude in Greenbrier County.

The northern end of the fold is about one mile east of Trout Post-Office, and from that point the axis has been traced in a general southwest direction, passing ½ mile west of Sunlight and is located about 0.7 mile east of the town of Williamsburg, from which the fold was named. Continuing southwestward the axis is on the crest of Brushy Ridge, passing through Alta and Brushy Ridge School. Near Asbury there is an offset along the axis to the east; the crest line, as shown by the dashed, red line on Map II, crosses a low saddle in a southeast direction for a distance of about one mile. Resuming its southwest course the fold passes through the south end of Muddy Creek Mountain, the axis passing midway between Hawver School and Fearnster School and reaching the Greenbrier River one mile east of Alderson. The total length in Greenbrier as described is 23 miles.

The fold is unusual in that it is quite severe yet very narrow and that the dip is more rapid on the east side than on the west. At Alta the crest of the anticline is structurally more than 1000 feet higher than the area 0.7 mile to the east and an equal amount above the area 1.4 miles to the west; indicating both the sharpness of the reversal and the steeper east limb. The rocks along the crest of the anticline between Brushy Ridge School and about one mile southeast of Williamsburg are nearly horizontal, with the fold pitching to the north and south from these points. The northern end of the anticline plunges more rapidly than the southern end.

The surface rocks along the crest of the anticline are all Mississippian in age, belonging to the lower part of the Mauch Chunk Series, the Greenbrier Series, the Maccrady Series, and the Pocono Series. From the northern end, east of Trout Post-Office, to a point 1.2 miles northeast of Williamsburg, the entire thickness of the Greenbrier Series is at the surface. From this point to a point 0.3 mile northwest of Asbury the outcropping rocks belong to the Pocono Series with a thin band of Maccrady at each end. In the shallow structural saddle

around Asbury the basal members of the Greenbrier Limestone are at the surface and about ½ mile south of Asbury the Maccrady and Pocono again appear. Continuing south along the axis the entire thickness of the Greenbrier Series dips below the surface and on the south end of Muddy Creek Mountain, rocks of the Bluefield Group of the Mauch Chunk Series form the crest of the anticline. The upper part of the Greenbrier Series is again exposed in the Greenbrier River gorge.

Muddy Creek Mountain Syncline.—Muddy Creek Mountain Syncline is a broad structure with the west limb much steeper than the east limb. In many places the exact position of the axis of the fold is very difficult to find but its general location is clearly defined.

As shown on Map II the fold has been traced from its northern end, 1 mile north of Mt. Vernon School, extending in a general southwest direction to Frazier, just south of the Greenbrier River. Describing the fold in more detail: the axis passes ¼ mile east of Unus, follows Burns Run for a short distance, crosses U. S. Route 60 about 1½ miles west of Richlands, passes near Persinger School and follows the west side of Muddy Creek Mountain to Fry School, reaching the Greenbrier River just west of Frazier. It is possible that this fold is the northward continuation of the Laurel Creek Syncline of Reger[8].

The surface geology along the axis of Muddy Creek Mountain Syncline is mainly that of the Bluefield Group of the Mauch Chunk Series but around Unus, on Spice and Burns Runs, on the headwaters of Milligan Creek and along the Greenbrier River there are outcrops of the Greenbrier Limestone.

Sinks Grove Anticline.—The Sinks Grove Anticline of Reger[9] is a prominent fold crossing most of Monroe and Greenbrier Counties. Having its northern end at Gardner, the axis of the anticline extends in a southwest direction through the villages of Henning and Vago, passes 1½ miles east of Maxwelton and passes just east of Lewisburg through Wagner Hill.

[8]Op cit., p. 151.
[9]Op. cit., pp. 152-3.

Continuing southwest the axis makes a gentle curve around the city limits of Ronceverte, crosses the Greenbrier River slightly less than one mile east of Rockland and reaches the Monroe line midway between Hokes Mill and Nickells Mill. From this point the fold has been traced into Monroe County, passing 1/3 mile west of Sinks Grove, from which the fold was named, to a point 1.1 miles east of Lillydale where it disappears.

The surface rocks along the axis of the fold are almost entirely of the Maccrady Series. At a few points the basal beds of the Greenbrier Series may remain on the crest and where streams cut across the anticline the upper members of the Pocono Series are exposed.

Caldwell (Patton) Syncline.—The Patton Syncline of Reger[10] has been described in Monroe County as a weak structural feature starting 1 1/2 miles south of Sinks Grove, extending northeastward for six miles to the Monroe-Greenbrier County line 1 1/2 miles east of Patton. Because of its much greater extent and severity in Greenbrier County the fold has been renamed the Caldwell Syncline, from the town of the same name through which it passes and where it is a prominent structural feature.

From its northern end 1 1/2 miles north of Anthony, the axis of the syncline extends southwestward, in the general direction of the Greenbrier River, passes 1/2 mile west of Anthony, through Camp Loupemount, passes just west of Harpers, through Camp Alleghany to Caldwell. From Caldwell the axis of the fold continues southwest through Holliday School, crosses U. S. Route 219 1/4 mile west of Organ Cave, and reaches Second Creek and the Monroe County line one mile east of Patton.

The surface rocks along the syncline north of Caldwell are wholly of the Pocono Series except for a few small areas of Maccrady and Greenbrier rocks at and near Caldwell. Southwest of Caldwell the surface rocks along the axis are entirely of the Greenbrier Series except for a very small area of Maccrady that is at the surface two miles southeast of Ronceverte.

[10] Op. cit., p. 153.

PLATE VI.—Outcrop of Pickaway Limestone and shale in Monroe County on the east or right limb of a symmetrical anticline. Note the vertical fracture cleavage developed in the shale. Note also that the joints in the overlying limestone are normal to the bedding. This outcrop apparently proves that the formation of the joints in the limestone, described under "Pickaway Limestone," in Chapter VII, was independent of and occurred prior to the major folding of the Appalachians.

PLATE VII.—Small local fault in top of the Pocono along the C. & O. R. R. track at Caldwell.

PLATE VIII.—Drag folding in interbedded limestones and shales of the Rondout Group, 0.5 mile west of Alvon.

PLATE IX.—Gouge in bedding-plane fault in the Niagara Series, north side of Anthony Creek, 0.5 mile west of Alvon.

As indicated by the age of the outcropping rocks, the syncline deepens to the southwest and in general the rise is more rapid on the east side than on the west.

Maple Grove Anticline.—The Maple Grove Anticline of Reger[11] named from Maple Grove School, Greenbrier County, is a poorly defined structure with a total length of 10½ miles, six miles being in Monroe County and 4½ miles in Greenbrier County. Starting 1½ miles west of Pickaway it parallels the Caldwell (Patton) Syncline, entering Greenbrier County ¾ mile southwest of Maple Grove School. Passing ½ mile east of Organ Cave the fold merges into a terrace 1 mile northeast of Forestdale School.

Northeast of the county line the surface rocks along the crest belong to the Greenbrier, Maccrady, and Pocono Series, appearing in the order named.

Hurricane Ridge Syncline.—The Hurricane Ridge Syncline of Reger[12], described by him as originating in southwest Virginia, has been traced across Mercer and Monroe Counties to the Greenbrier County line ½ mile east of Maple Grove School. The fold has a length of only 3½ miles in Greenbrier County, merging into a terrace 1½ miles northeast of Forestdale School. Northeast of the county line the surface rocks along the axis of the syncline belong in the Greenbrier, Maccrady, and Pocono Series, appearing in the order named.

Browns Mountain Anticline.—The Browns Mountain Anticline of Darton[13], described in Pocahontas County in more detail by Price[14], is the same as the Harts Run Anticline of Reger[15]. As noted in the Pocahontas County report cited above, the structure is that of an anticlinorium, overturned to the west and it is now known to be faulted along the central west side.

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[11]Op. cit., p. 153.

[12]Op. cit., pp. 146-9.

[13]Darton, N. H., Monterey Folio, No. 61, U. S. Geol. Sur.; p. 6, 1898.

[14]Price, Paul H., Pocahontas County, W. Va. Geol. Sur.; pp. 80-1, 1929.

[15]Reger, David B., Mercer, Monroe, and Summers Counties, W. Va. Geol. Sur.; pp. 155-6, 1926.

From its northern end near Bartow, Pocahontas County, the main axis has been traced southwest along Michael, Browns, Brushy, and Beaver Lick Mountains to the Greenbrier County line, 2 miles southeast of Burr School. From the county line the main crest has been traced southwest along Beaver Lick Mountain passing ½ mile west of Alvon and continues in the same direction along Coles Mountain. In the vicinity of Eckle School and Bobs Ridge the anticlinorium effect is more pronounced with three distinct anticlinal ridges. The main axis shifts to the east and coincides with Bobs Ridge to White Sulphur Springs passing through the lily pond on the Greenbrier Hotel grounds. Continuing southwestward the main axis leaves Howard Creek 1½ miles east of the mouth of Harts Run, passes ½ mile east of Harts Run School, and leaves Greenbrier County just west of Rich Mountain. The fold has been traced some nine miles farther into Monroe County, its southern end being 1½ miles west of Red Mill, Monroe County. The total length of the anticlinorium is 80 miles, 39½ miles being in Pocahontas County, 31½ miles in Greenbrier County, and 9 miles in Monroe County.

The outcropping rocks near the center of the anticlinorium, near the Greenbrier-Pocahontas line, include the oldest rocks that are exposed in Greenbrier County. The fault along the west side of Beaver Lick Mountain brings nearly all or perhaps all of the Red Medina rocks to the surface so that all or nearly all of the Silurian rocks and the Lower Devonian rocks are exposed in a band less than a mile wide along the fault. The fault will be described in more detail under "Faults" at the end of this Chapter. Southeast along the anticlinorium the fault dies out and the main fold plunges. One mile east of Upper Little Creek School the Silurian rocks dip below the surface with rocks of Lower Devonian age forming the crest of the fold. A few small areas of Marcellus rocks were noted along the crest of the anticlinorium about 2½ miles north of Alvon. One mile north of Alvon along the east side of Beaver Lick Mountain, rocks of the Niagara Series are exposed and in the Anthony Creek gorge just west of Alvon the upper part of the Clinton Series outcrops. Southwestward from the gorge there are no rocks along the fold older than Devonian exposed

and except for the northern end of Coles Mountain and around Bobs Ridge the surface rocks along the axis belong in the Oriskany Series. At White Sulphur Springs the surface rocks along the crest belong to the Marcellus Series and southeast the fold continues to pitch with Upper Devonian rocks along the crest of the structure, the rocks at the county line belonging to the Chemung Series.

For details of the structure of this anticlinorium the reader is referred to the cross-sections on the margin of Map II (in Atlas) and to the discussion of faults at the end of this Chapter.

Stony River Syncline.—The Stony River Syncline of Darton and Taff[16] originates along the North Branch of the Potomac River in Mineral County and has been traced southwestward across Grant, Tucker, Randolph, and Pendleton Counties, passing into Highland County, Virginia, two miles east of the common corner of Pendleton, Pocahontas, and Highland. Remaining in Virginia for nine miles the axis of the syncline enters Pocahontas County where the Staunton and Parkersburg Pike crosses the State line, 2.2 miles east of Top of Allegheny. From this locality it continues southwestward and follows, in general, the State line to Laurel Creek, where the main axis is found 1 mile west of Rimel. The fold enters Greenbrier County at Middle Mountain and coincides with this mountain to its southern end one mile northwest of Neola. The axis of the main basin crosses Anthony Creek ¼ mile east of Bound School and turning about due south the fold loses its identity on Whitmans Draft four miles south of Alvon.

In Greenbrier County this structural basin is a broad gentle syncline, much complicated by crumpling of the relatively incompetent shales and sandstones of the Upper Devonian. The surface rocks along its axis belong exclusively to the Chemung and Portage Series.

Neola Anticline.—The Neola Anticline, not previously named or described, roughly parallels the Stony River Syncline. Originating 4½ miles south of Alvon the axis extends

[16]Darton, N. H., and Taff, J. A., Piedmont Folio, No. 28, U. S. Geol. Sur.; 1896.

northeastward, crossing Whites Draft 1.2 miles east of Whites Draft School. From this locality the axis extends northward to a point one mile east of Bound School where it again resumes its northeast course. From this point the main axis follows the western side of Anthony Creek, passing through the western edge of the town of Neola and leaving Greenbrier County 1.3 miles northeast of Trainer. It is probable that the Neola Anticline connects with the unnamed anticline at Rimel in Pocahontas County.

The exact location of the axis of this anticline, like that of the syncline to the west, is difficult to determine due to the crumpling of the rocks. It is not unusual to find six or more reversals of dip in a distance of half a mile across the strike of the rocks. Dips of 80 degrees are common and locally the beds may be overturned. The rocks along the main axis belong to the Portage Series.

Meadow Creek Syncline.—The Meadow Creek Syncline, not previously named or described, is a well-defined basin in eastern Greenbrier County. The axis nearly coincides with Meadow Creek, from which it was named, and with Laurel Run. Paralleling the State line the total length of the syncline is probably not much greater than the 15 miles present in Greenbrier County.

The surface rocks along the axis belong to the Pocono Series.

Kates Mountain Syncline.—The northern end of the Kates Mountain Syncline of Reger[17] is about ½ mile east of Pleasant Valley School. The axis extends in a southwest direction passing along the length of Kates Mountain and leaves Greenbrier at the southern end of Kates Mountain. The syncline has been traced nine miles into Monroe County, terminating 1½ miles northeast of Red Mill in that county. Its length in Greenbrier County is eight miles.

The surface rocks along the axis are confined to the Chemung Series with the basal beds of the Pocono Series being retained on Kates Mountain.

[17] Op. cit., p. 156.

Glace Anticline.—The Glace Anticline of Reger[18] has a length of five miles in Monroe County, starting ½ mile northeast of Elk Knob in that county and entering Greenbrier County one-half mile northward from Glace. Northeastward the axis passes one mile west of Upper Tuckahoe School, crosses Dry Creek 0.6 mile northwest of Lower Tuckahoe School, and terminates 0.6 mile east of Pleasant Valley School. The length of the fold in Greenbrier County is 8½ miles and the surface rocks along its axis belong to the Chemung Series.

Tuckahoe Syncline.—The Tuckahoe Syncline, not previously named or described, is a small but sharp down warp with a total length of 9½ miles. Starting on Brushy Mountain the axis of the syncline has been traced southwestward, crossing U. S. Route 60 about 1½ miles east of Pleasant Valley School and about two miles west of the Virginia State line. From this point the axis crosses O'Neill Knob, passes 0.2 mile west of the village of Tuckahoe, from which it receives its name, and follows the west side of Dry Creek to Upper Tuckahoe School. From this locality the axis continues southwestward and terminates on Grindstone Ridge near the Monroe County line. The surface rocks along the axis belong in the Chemung Series with a small area of Pocono rocks on O'Neill Knob.

CROSS-SECTIONS.

In central and eastern Greenbrier County the rocks are often standing at steep dips and in some cases are slightly overturned or otherwise so disturbed that structure contouring is not possible. In this area the contours are replaced by dip and strike symbols and in addition four cross-sections have been prepared to show in graphic manner the position of the various beds. All of these cross-sections have been made on a vertical and horizontal scale of 1:62,500, or 5208 feet to the inch, which is the same scale as the topographic map. Each of them extends approximately at right angles to the strike of the rocks and are so spaced as to illustrate the most interesting features.

Cross-Section A—A′.—Cross-Section A—A′ is 2.6 miles long beginning on the headwaters of Little Creek, one mile

[18]Op. cit., p. 156.

south of the Pocahontas County line and extending across Beaver Lick Mountain to the North Fork of Anthony Creek. The section was drawn to illustrate the Burr Fault. Here the red sandstones and sandy shales of the Red Medina are lying on the overturned Marcellus black shales. The fault's projection below the surface is hypothetical but is believed to be as shown in the cross-section.

Cross-Section B—B′.—Cross-Section B—B′ begins on Cold Knob on Cold Knob Mountain, extends along Chestnut Ridge, through Falling Springs (Renick P. O.), through the Anthony Creek gorge at Alvon and ends at the State line ½ mile north of Smith Knob. The surface rocks along the section range from the Pottsville Series down to the Clinton Series. The total length of the section is 22 miles.

Cross-Section C—C′.—This is a short section extending from Greenbrier Mountain through the southern tip of Coles Mountain, through Bobs Ridge and ending on Sulphur Lick Run. The surface rocks are entirely Devonian with all of the series represented. The section was drawn at this point to illustrate the complex anticlinorium.

Cross-Section—D—D′.—This 22-mile long section crosses about two-thirds of the county. Starting at Clintonville it extends southeastward, passes just south of Alta, through Lewisburg and Caldwell, and ends at the State line two miles northeast of the common corner of Greenbrier, Monroe, and Alleghany Counties. The surface rocks include the Bluefield Group of the Mauch Chunk Series, the Greenbrier, Maccrady, and Pocono Series of the Mississippian, and the Chemung and Portage Series of the Devonian.

UNCONFORMITIES.

All of the regional unconformities noted in Greenbrier County belong to the type known as disconformity, i.e., the beds above and below the surface of erosion are approximately parallel. As a result they are of minor importance from a structural standpoint and only a brief discussion of each unconformity will be given here. For more detailed discussion of

the unconformities the reader is referred to the discussions of the contacts, given in the Chapters on Stratigraphy of the various series. (See Index for page references).

The uppermost important time break in the geologic column is at the contact of the Pottsville Series of the Pennsylvanian with the underlying Mauch Chunk Series of the Mississippian. The contact is that of an overlap of transgression, with younger and younger beds of the Pottsville resting on the Mauch Chunk. As is the case with all unconformities of this type, the lapse of time between the deposition of the underlying and the overlying beds varies in the direction of the overlap and in this case the interval becomes greater in a north and northwest direction.

The next lower regional unconformity is at the contact of the Greenbrier Series with the underlying Maccrady Series. The contact between the massive limestone and the Maccrady red shales is usually sharp but occasionally a thin calcareous shale is present, giving to the contact a blended appearance. The apparent absence of beds representing the Warsaw and Spergen Formations of the Mississippi Valley suggests the time value of the unconformity.[19]

Another unconformity is found at the contact of the Pocono Series with the Chemung Series.[19]

The contact between the Helderberg Series of the Devonian and the Bossardville Series of the Silurian has been reported as unconformable, in reports on near-by areas. In Greenbrier County there is insufficient evidence to determine the exact relationship of the two beds but the relationship is tentatively considered to be that of a disconformity.

FAULTS.

Only one major fault was noted in the county, that being along the west side of Beaver Lick Mountain near the Pocahontas County line. Several small faults were noted but only four of these are worthy of mention.

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[19]The full time value of the unconformities at the base of the Greenbrier Series and at the base of the Pocono Series can not be determined until paleontologists agree upon the time range of the various fossils of the upper Devonian and lower Mississippian. (See discussion under "Pocono Series," in Chapter VII).

Two and one-half miles north of Alderson a small fault was mapped that involves the basal members of Mauch Chunk Series. The Lillydale Shale is overturned with an 80-degree dip to the southeast, while a short distance northwest the same shales are seen in a normal position with a 10-degree northwest dip. It is not possible to determine the amount of displacement but it must be small since the shales are rarely more than 100 feet thick.

Two miles farther north and $2\frac{1}{2}$ miles southeast of Blue Sulphur Springs a similar condition was noted but here the upper beds of the Greenbrier Series are exposed at the fault. The Alderson Limestone is slightly overturned with an 85-degree dip to the southeast. Above the Alderson (to the northwest) is a concealed interval of about 20 feet and the next visible bed is a limestone that is probably the Glenray. The latter bed which contains a number of small rectangular blocks of limestone that have been cemented together, is right side up and has a northwest dip of 5 degrees. The Lillydale Shale that would normally occur between these two limestones should have a thickness of about 100 feet, which indicates a displacement of about 80 feet. No entirely satisfactory explanation can be given to account for the rectangular blocks in the limestone but the most plausible theory is that of jointing, plus solution and cementation. Joints that are closely akin to true cleavage joints have been developed in the Alderson Limestone.

Along the Midland Trail (U. S. Route 60) 1.4 miles northwest of Alta an apparent fault was noted that is similar to the two just described. The Glenray Limestone is standing nearly vertical while a short distance northwest the Droop Sandstone is nearly horizontal. No absence of beds could be proved although the interval between the Droop Sandstone and Glenray Limestone is smaller than would be expected.

A small vertical fault with a displacement of five feet was noted $\frac{3}{4}$ mile northwest of Oscar P. O. The lower part of the Alderson Limestone and the Greenville Shale are exposed at the point observed.

Burr Fault.—The Burr Fault, not previously named or described, is a major overthrust, located along the west side of Beaver Lick Mountain. It receives its name from the small settlement of Burr, in Pocahontas County, on the west side of Beaver Lick Mountain, ½ mile north of the Greenbrier County line. The outcrop of the fault-plane is usually concealed so that its exact location and extent (as shown on Map II) is, in some respects, approximated. On the headwaters of Little Creek the fault contact was found and at this point the Red Medina sandstones and sandy shales are thrust up and over the Marcellus black shales. The red sandstones and sandy shales have been so mashed and metamorphosed that it was not possible to distinguish the true bedding-planes and the underlying black shales show numerous crenulated drag folds. The thickness of rocks that normally occur between the Marcellus and the Red Medina is about 1700 feet, which with the 800 feet of Red Medina exposed and an undetermined thickness of the Marcellus, indicates a total throw at this point, of more than 2500 feet. Cross-section A—A′ was drawn to illustrate the fault at the point just described and it is reproduced on the margin of Map II.

CHAPTER V.

MEASURED SECTIONS.

INTRODUCTION.

The surface or outcropping rocks of Greenbrier County include the Quaternary, with Recent and Pleistocene deposits, and a considerable portion of the Paleozoic, including the lower portion of the Pennsylvanian, the Mississippian, the Devonian, and the greater part of the Silurian sediments. A classification of these beds, approximating 14,385 feet of rocks, is shown in Figure 7, pages 131-133.

The Quaternary Rocks are represented by clays, gravels, and sand beds, present along the river and creek valleys, and by river-terrace deposits now resting many feet above the present streams. Some of these terraces are undoubtedly of Pleistocene age, although there is no evidence of glacial origin. These two types of formations, which make up the best farming lands along the larger streams, are represented on Map II under Alluvium.

The Kanawha, New River, and Pocahontas Groups of the Pottsville Series of the Pennsylvanian, with an approximate thickness of 1,540 feet of strata, are the youngest of the Paleozoic rocks present, and they undoubtedly once covered Greenbrier County. They are now confined to the western part of the county, their eastern extension having been removed by erosion.

The Mauch Chunk Series of the Mississippian is subdivided into four groups, Bluestone, Princeton, Hinton, and Bluefield, and contains approximately 2,805 feet of sediments, constituting a considerable portion of the surface of Greenbrier County west of the Greenbrier River.

The Greenbrier Series of the Mississippian contains about 750 feet of rocks that are predominantly calcareous. Its best exposures are found in a belt immediately west of the Green-

brier River. The new road cuts along the Seneca Trail (U. S. Route 219) afford many good exposures that offer opportunity for study.

The outcrop of the Maccrady Series of the Mississippian lies immediately beneath the Greenbrier Series. It is found in a belt west of the Greenbrier River the entire length of the county, from Monroe on the south to Pocahontas on the north. It varies in thickness from 60 feet at the northern end of the county to 250 feet at the southern end as compared to 700 feet or more at its type locality in Smyth County, Virginia.

The Pocono Series comprises the basel members of the Mississippian[1] in Greenbrier County and is seen to its best advantage along the Greenbrier River. This series decreases in thickness from approximately 600 feet at its best development in this area, to some 205 feet, in the Hinkle Well near Trout P. O.

The Devonian outcrops in Pocahontas County are confined to the area east of the Greenbrier River, with the exception of the Catskill Series which outcrops along the river and occasionally west of it. The entire assemblage has a thickness of approximately 6,390 feet as compared to 11,000 feet in northeastern West Virginia. The Chemung Series retains a good development throughout the county and may be seen in its entirety along the State road east of Caldwell. Apparently all of the remaining series are retained in this area.

The Silurian rocks comprise the oldest sediments exposed in the county and are limited to the region east of the Greenbrier River along Beaver Lick Mountain. Their maximum thickness is approximately 2,050 feet.

In the area west of the Greenbrier River the gently dipping beds permit the measurement of numerous vertical sections, and the study in detail of the character of the surface rocks, while east of this area where the rocks are steeply dipping, additional sections have been obtained along streams and road cuts, where it was possible to determine, approximately, the vertical thicknesses by trigonometric computation. All of these sections appear in the following pages.

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[1]See the discussion of the age of the Pocono Series in Chapter VII.

In the measurement of these sections numerous fossil collections were made and reference is often shown in parenthesis by number, referring to the particular zone described. These collections have all been examined by the late Dr. John L. Tilton and or Prof. Dana Wells, and the results of their examinations are published as Chapter XIV, Notes on Paleontology.

Additional fossil collections were made by Dr. David White, David B. Reger, and Paul H. Price with particular emphasis on the fossil flora, but the results of these collections will not be available for this report.

MEASURED SECTIONS, MEADOW BLUFF DISTRICT.

Meadow Bluff District, the largest district, occupies a vast area in the extreme western part of Greenbrier County. It is bounded on the west by Fayette County and on the northwest by Nicholas County. The district line, along the northeast, follows the crest of Beech Ridge to Grassy Knob, thence southwest along Old Field Mountain, Buffalo Mountain, and Meadow Mountain to Clintonville. From this point the district line turns more to the west passing through Smoot and reaches the Greenbrier-Fayette County line 3.2 miles southeast of the town of Springdale (Fayette County). Its surface rocks range from the Kanawha Group of the Pottsville down to the base of the Hinton Group of the Mauch Chunk. All of the commercial coal mines operating in the county are located in this district.

The following section, prepared by Ray V. Hennen[2], was measured along the eastern boundary of Fayette County and shows the development of the Pocahontas Group of the Pottsville in eastern Fayette and southwestern Greenbrier Counties:

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[2]Hennen, Ray V., Fayette Report, W. Va. Geol. Survey, p. 219; 1919.

Turniphole Mountain—½ Mile Northwest Section.

Fayette County, Quinnimont District; measured with aneroid from the road summit, 0.7 mile northwest of Turniphole Mountain, southward along the hill road to the top of the Mauch Chunk Red Shales.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (311′)		
Sandstone, grayish-white, **Pineville (?)**	45	45
Concealed	5	50
Sandstone, shaly	35	85
Concealed	5	90
Shale, black, **Royal, Lingula** fossil shells abundant	9	99
Coal, soft, No. 6 Pocahontas (No. 411 on Map II)	4	103
Shale, gray and dark	10	113
Coal, blossom, heavy, **No. 6 Pocahontas**, lower bench **(No. 411A on Map II)**	2	115
Concealed and shale, sandy	39.5	154.5
Coal, slaty, (6″), **No. 4 Pocahontas**	0.5	155
Sandstone, coarse, broken, **Upper Pocahontas**	13	168
Shale	1.5	169.5
Coal, soft, (5″), **No. 3 Pocahontas**	0.5	170
Shale, sandy	5	175
Shale, flaggy, and sandy	29	204
Coal, soft 0′ 8″; Shale, gray 0 1; **Coal**, soft 0 1 — **No. 2 Pocahontas** (10″)	1	205
Sandstone, shaly at bottom	15	220
Concealed and sandstone	55	275
Fire clay shale	5	280
Concealed and sandstone to red shale, top of **Mauch Chunk Series**	31	311

Sims Station Section.

Meadow Bluff District; starting along road ascending Sims Mountain one mile south of Sims Station, measured with aneroid. Rewritten in descending stratigraphic order. The measurements are somewhat greater than true vertical owing to a dip of about 125 feet.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (370′+)		
Coal, reported, **Fire Creek? (3255′ B.)**	......	......
Concealed	5	5
Sandstone. medium-grained, gray to brown	10	15
Concealed	28	43
Coal, supplied from other side of hill **(No. 372 on Map II) Little Fire Creek?**	2	45
Concealed	20	65
Sandstone, brown	5	70
Concealed, with sandy shale	25	95
Sandstone, medium- to coarse-grained, brown, **Pineville?**	20	115

	Thickness. Feet.	Total. Feet.
Shale, sandy, gray to brown	5	120
Sandstone, medium-grained, gray to brown, irregular bedding, **Flattop?**	30	150
Concealed	22	172
Coal, at road forks, reported at prospect **No. 414 on Map II** 0′ 8″ to 1′ 0″ thick, **No. 6 Pocahontas?** (base, 3082′ L.)	1	173
Shale, "fire clay"	1	174
Concealed and sandstone	59	233
Shale, weathers light-gray, many plant fossils	2	235
Coal, trace	0.0	235
Concealed	4.7	239.7
Coal, No. 4 Pocahontas? (base 3015′ B.) (**No. 469 on Map II**)	0.3	240
Shale, "fire clay"	2	242
Shale, sandy, partly concealed	10	252
Sandstone, shaly	37	289
Shale, sandy	5.7	294.7
Coal, No. 3 Pocahontas? (2960′ B.) (**No. 484 on Map II**)	0.3	295
Shale, "fire clay"	1	296
Concealed, with shale, yellowish-brown, sandy	53	349
Shale, black, **No. 2 Pocahontas?** (2905′ B.)	1	350
Shale and concealed, yellowish-brown	20	370
Mauch Chunk Series—Bluestone Group (330′)		
Shale, red, definite, in road in front of church (top, 2890′ B.)	5	375
Shale, red, variegated, and concealed	85	460
Sandstone	35	495
Shale, red, and concealed	90	585
Concealed	115	700
Mauch Chunk Series—Princeton Conglomerate (20′+)		
Sandstone medium-grained ... 5′; Sandstone, coarse grained, with some pebbles ... 15+ — **Princeton Conglomerate** (top, 2560′ B.)	20	720
Concealed to Sims Station	......	......

Sims Mountain Section—North End.

Meadow Bluff District; starting on the north end of Sims Mountain, 1 mile east-southeast of Rainelle, and measured with aneroid along the road descending the mountain. The measurements are greater than true vertical owing to a dip of about 120 feet. Arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (427′+)		
Sandstone, pink, broken, limonite veins ......30′; Sandstone, white, thin-bedded ......30 — **Quinnimont**	60	60
Coal, soft, impure, **Fire Creek** (2985′ B.) (**No. 310B Map II**)	0.8	60.8

	Thickness. Feet.	Total. Feet.
Shale, "fire clay," plant fossils abundant	2.2	63
Concealed	12	75
Sandstone, gray to pink, weathers brown, irregularly bedded	30	105
Shale, chocolate colored, with coal streaks, Little Fire Creek? (2940′ B.) (No. 373 on Map II)	3	108
Sandstone, much weathered, limonite veins	20	128
Shale, almost a sandstone, much weathered	35	163
Sandstone, massive, fine-grained	7	170
Concealed and sandstone, mostly concealed	35	205
Coal, No. 6 Pocahontas? (2840′ B.) (No. 415 on Map II)	0.2	205.2
Concealed, sandy	59.8	265
Coal, soft, impure, No. 4 Pocahontas? (2780′ B.) (No. 470 on Map II)	1	266
Shale. "fire clay," abundant plant fossils	2	268
Sandstone, weathered, brown, loosely cemented, Upper Pocahontas	55	323
Concealed, sandy	77	400
Shale, black, No. 1 Pocahontas Coal horizon? (No. 500 on Map II)	2	402
Estimated interval to top of Mauch Chunk Series	25	427

Goddard Mountain Section—West Side.

Meadow Bluff District; starting at a point near the top of Goddard Mountain and measured with aneroid down the trail on the west side of the mountain to Boggs Creek. The measurements are greater than true vertical owning to a dip of about 70 feet. Arrangement in descending stratigraphic order.

				Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (415′+)					
Sandstone, cap rock (base, 3180′ B.)				25	25
Concealed				95	120
Coal blossom, (3085′ B.)				0	120
Sandstone, massive, cross-bedded				25	145
Sandstone, brown, cross-bedded				25	170
Concealed				139	309
Shale				3.5	312.5
Coal	0′	2″	No. 3 Pocahontas (base, 2890′ B.) (Mine No. 486 on Map II)	2.5	315
Shale	0	1			
Coal	0	1			
Shale	0	5			
Coal	0	1½			
Shale	0	2			
Coal, clean, good	1	5½			
Shale floor				0	315
Concealed				100	415
Mauch Chunk Series—Bluestone Group (300′)					
Concealed, (top, estimated, 2790′)				300	715
Mauch Chunk Series—Princeton Conglomerate (5′+)					
Sandstone, Princeton Conglomerate, exposed				5	720

Little Sewell Mountain Section—South End.

Meadow Bluff District; measured with aneroid from the top of the point on the south end of Little Sewell Mountain, traversing southwestward to the county road, thence south to the road forks at 2987′ L., thence southeastward to the B. M. 2467′.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (369′+)		
Sandstone, (cliff) makes top	50	50
Shale, dark, lenticular, 3′ to	4	54
Coal, Little Fire Creek? (No. 375 on Map II). (3390′ B.) fallen shut, thickness reported as	2.5	56.5
Shale, fire clay	0.5	57
Sandstone, brown, coarse, and concealed	94	151
Coal, bony 0′ 3″		
Coal, block 0 3		
Pyrite 0 0¼		
Coal, columnar, laminated with fusain (mineral charcoal).. 0 9		
Coal, hard 0 5		
Coal, laminated with fusain (mineral charcoal) and pyrite 1 4		
Coal, bony 0 4		
No. 7 Pocahontas (No. 383 on Map II) (3290′ B.)	3.4	154.4
Shale	17.6	172
Coal, No. 6 Pocahontas, (No. 421 on Map II) (3270′ B.)	3	175
Concealed	80	255
Coal, No. 3 Pocahontas, (No. 491 on Map II) (3190′ B.)	1	256
Concealed	13	269
Sandstone	35	304
Coal (3140′ B.)	0.8	304.8
Fire clay	1.2	306
Shale, brown, sandy	8	314
Coal (3130′ B.)	0.3	314.3
Shale, sandy	9.7	324
Shale, chocolate-colored	1	325
Shale, sandy	14	339
Sandstone, shaly	8	347
Concealed and shale, brown, sandy	22	369
Mauch Chunk Series (608′+)		
Shale, red and variegated (top, 3075′ B.)	5	374
Sandstone, shaly, brown to green	5	379
Concealed	20	399
Sandstone, shaly, green	10	409
Shale, red and variegated	20	429
Sandstone, shaly, green	10	439
Coal and black shale (3005′ B.)	1	440
Shale, red, variegated, and concealed	100	540
Sandstone, medium- to fine-grained, makes cliff	25	565
Shale, sandy, brown	20	585
Sandstone, brown, shaly at top	25	610
Shale and shaly sandstone	80	690
Concealed	75	765
Shale, dark	5	770

	Thickness. Feet.	Total. Feet.
Sandstone, fine- to medium-grained, no pebbles seen, **Princeton?**	7	777
Shale, brown, sandy, and concealed to B. M. 2467′ at road forks	200	977

Little Sewell Mountain Section—West Side.

Meadow Bluff District; measured with aneroid along the road down the west side of Little Sewell Mountain. The measurements above the Mauch Chunk are somewhat greater than true vertical owing to a dip of about 80 feet as shown by the contours on Map II. Arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (355′+)		
Concealed from road forks	15	15
Sandstone, gray, medium-grained, zone of carbonized plants 20′ from base, thin-bedded at top, more massive at base, but irregular bedding throughout	35	50
Concealed, sandy	95.2	145.2
Coal, soft, No. 6 Pocahontas, (2885′ B.) **(No. 418 on Map II)**	0.8	146
Shale, dark-gray, many fossil plants	3	149
Sandstone, white, micaceous	4	153
Shale, fissile, iron-stained	5	158
Shale, dark-gray, slightly calcareous, fossiliferous	3	161
Concealed	54.8	215.8
Coal, No. 4 Pocahontas (2810′ B.) **(No. 472 on Map II)**	0.2	216
Concealed	31	247
Sandstone	2	249
Shale, sandy, many plant fossils	2	251
Coal, soft, good, No. 3 Pocahontas, (supplied from opening below road at **No. 488 on Map II**) (2780′ B.)	2	253
Concealed	10	263
Sandstone, thin-bedded	15	278
Concealed	49.5	327.5
Coal (2705′ B.)	0.5	328
Shale, chocolate-colored, many fossil rootlets	2	330
Sandstone, thin-bedded at top, massive at base	25	355
Mauch Chunk Series—Bluestone Group (255′)		
Concealed	100	455
Sandstone, much weathered, reddish-brown	5	460
Concealed and red shale	150	610
Mauch Chunk Series—Princeton Conglomerate (5′+)		
Sandstone, medium-grained, **Princeton Conglomerate** (2415′ B.)	5	615

The following section, prepared by Ray V. Hennen[3], starts at the top of a hill one-half mile west of Russellville, Nuttall District, Fayette County, and extends eastward, with aneroid

[3]Hennen, Ray V., Fayette Report, W. Va. Geol. Survey, pp. 176-177; 1919.

measurement, to Meadow River at Russellville and is continued with the record of the **Mrs. E. T. Martin Coal Test Boring—No. 1 on Map II** located in Meadow Bluff District, Greenbrier County, just opposite the town. The record of the coal test was kindly furnished the Survey by Samuel Stephenson, of Charleston, West Virginia. In line with recent studies a few minor changes in correlation have been made:

Russellville Section.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series—New River and Pocahontas Groups (733′+)				
Concealed in gentle slope with small grayish-white boulders from summit of hill	65	0	65	0
Concealed in bench	10	0	75	0
Sandstone, grayish-white	20	0	95	0
Concealed in bench	15	0	110	0
Sandstone, current-bedded, grayish-white, **Guyandot**	30	0	140	0
Concealed, mostly sandstone	25	0	165	0
Shale, buff, sandy	20	0	185	0
Coal, Sewell "B", and concealed	10	0	195	0
Concealed	5	0	200	0
Sandstone, current-bedded, **Lower Guyandot**	25	0	225	0
Concealed	3	6	228	6
Coal, Sewell (2045′ B.)	1	6	230	0
Concealed, steep slope, mostly sandstone	45	0	275	0
Concealed, gentle slope	25	0	300	0
Concealed, steep slope	15	0	315	0
Sandstone, grayish-white, making cliff, **Upper Raleign**	45	0	360	0
Concealed to top of coal test boring	5	0	365	0
(Continued with log of Mrs. E. T. Martin Coal Test Boring—No. 1 on Map II, Elevation top of hole, 1930′ B.)				
Surface	10	0	375	0
Sandstone	10	0	385	0
Slate, gray	57	0	442	0
Bone	0	4	442	4
Sandstone, hard, **Lower Raleigh**	26	0	468	4
Slate, gray	65	3	533	7
Shale, dark, sandy	17	10	551	5
Slate, gray	27	5	578	10
Sandstone and shale..... 4′ 7″ / Sandstone 10 7 / Sandstone, pebbly 2 0 / Sandstone 2 0 — **Pineville**	19	2	628	0
Fire clay	3	6	631	6
Sand, shale	10	8	642	2
Slate, gray	12	5	654	7
Slate, black	1	2	655	9
Coal, dirty	1	8	657	5

	Thickness. Ft.	Thickness. In.	Total Ft.	Total In.
Fire clay	1	5	658	10
Sandstone	11	2	670	0
Coal	1	2	671	2
Fire clay	2	0	673	2
Sandstone	3	1	676	3
Shale, dark, sandy	6	6	682	9
Slate, gray	6	7	689	4
Sandstone	4	0	693	4
Shale, dark, sandy	5	9	699	1
Fire clay	1	10	700	11
Shale, sandy	15	4	716	3
Sandstone	9	4	725	7
Slate, black	1	1	726	8
Coal, No. 6 Pocahontas	2	5	729	1
Fire clay	2	0	731	1
Sandstone, to bottom of hole	1	11	733	0

Charmco Section.

Meadow Bluff District; starting on a high knob on Laurel Creek Mountain 0.3 mile southwest of Orient Hill Church measured with aneroid and hand-level to the road forks on the divide, then south along the highway to Charmco. Measurements are less than true vertical due to a northwest dip of about 150 feet as shown by the green contours on Map II. Arrangement in descending stratigraphic order.

			Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (825′+)				
Interval from top of knob to the Joe Neff mine on Snowden Crane property			200	200
Shale, dark, **Hartridge**			1.9	201.9
Coal, hard, laminated and blocky	0′	11½″		
Shale, with **coal** streaks	0	4		
Coal, columnar, soft	1	1		
Mineral charcoal	0	0¼		
Coal, laminated, light and dull	0	11½		
Coal, laminated, soft	0	4		
Coal, hard	0	2		
Shale, reported	1	0		
Coal, reported	1	3		
Sewell (3065′ B.) (**No. 51 on Map II**)			6.1	208
Concealed to top of bench			45	253
Sandstone, brown to gray, cross-bedded, medium-grained, **Upper Raleigh**			55	308
Shale, sandy and concealed			15	323
Coal, Little Raleigh "A" (2950′ B.) (**No. 231B on Map II**)			0.3	323.3
Fire clay			2.7	326
Concealed			12	338
Fire clay			4	342
Concealed			6	348

	Thickness. Feet.	Total. Feet.
Coal, Little Raleigh (2925′ B.) (**No. 231A on Map II**)	1	349
Shale, sandy	4	353
Sandstone, gray to brown	8	361
Concealed	7	368
Shale, sandy, gray to brown and concealed	10	378
Concealed	20	398
Sandstone, brown, shaly	10	408
Concealed	5	413
Sandstone, brown, shaly	5	418
Shale, brown, sandy	10	428
Concealed	35	463
Shale, gray to brown	20	483
Sandstone	5	488
Concealed	8	496
Sandstone	22	518
Shale, sandy, gray to brown, and concealed	17	535
Fire clay (2735′ B.)	3	538
Shale, sandy	10	548
Concealed	27	575
Coal, No. 7 Pocahontas, (2695′ B.) (**No. 385 on Map II**) fallen shut, visible 2′ to	3	578
Fire clay	2	580
Shale, sandy, variegated, and concealed	27	607
Coal, banded bright and dull 1′ 8″; **Coal,** soft, partly columnar 1 4 — **No. 6 Pocahontas** (2565′ B.) (**No. 430 on Map II**)	3	610
Shale, sandy and concealed	15	625
Sandstone	5	630
Concealed	35	665
Sandstone	10	675
Concealed	10	685
Sandstone, brown, fine-grained	5	690
Concealed	5	695
Coal 0′ 1″; Fire clay 1 9; **Coal** 0 2 — **No. 3 Pocahontas** (top, 2580′ B.) (**No. 492 on Map II**)	2	697
Concealed	35	732
Sandstone, shaly, fine-grained	4	736
Sandstone, many carbonized plants	1	737
Sandstone, medium- to coarse-grained, massive	5	742
Sandstone, shaly	5	747
Concealed	17	764
Shale, black, **No. 1 Pocahontas Coal** horizon? (2510′ B.) (**No. 502 on Map II**)	1	765
Concealed	30	795
Sandstone	30	825
Mauch Chunk Series—Bluestone Group (49′+)		
Shale, red, found in J. E. Dorsey water well above road	5	830
Concealed to road fork at Charmco (BM 2401′)	44	874

Quinwood Section.

Meadow Bluff District; starting at the road forks at the western edge of Quinwood and measured with aneroid ascending the mountain westward along the road. The intervals are somewhat less than true vertical measurements due to a northwest dip of about 75 feet as shown by the contours on Map II. Arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River Group (411′+)		
Sandstone, medium-grained, brown, irregular bedding, caps knob, **Upper Nuttall** (top, 3432′ B.)	20	20
Shale, sandy and concealed	25	45
Coal blossom, **Iaeger "B"** (**No. 1 on Map II**)	......	45
Concealed	25	70
Concealed in bench	20	90
Sandstone, gray, medium-grained, irregular bedding, **Lower Nuttall**	30	120
Shale, gray, sandy, **Upper Iaeger**	20	140
Concealed	20	160
Coal, slaty, **Hughes Ferry** (**No. 2 on Map II**) (top, 3272′ B.)	2	162
Shale, sandy, gray	9	171
Concealed	5	176
Sandstone, irregular bedding, **Middle Iaeger**	19	195
Concealed	4	199
Coal, impure, **Lower Iaeger** (**No. 4 on Map II**) (top, 3233′ B.)	3	202
Sandstone, brown to gray, shaly, **Lower Iaeger**	28	230
Shale, gray to brown, fissile	5	235
Shale, black	1	236
Concealed	3	239
Sandstone, fine- to medium-grained, gray to brown, **Harvey Conglomerate**	20	259
Concealed	10	269
Coal	0.5	269.5
Shale, "fire clay"	1.5	271
Shale, gray to brown, sandy, **Sandy Huff**	52	323
Coal, Castle, (**No. 5 on Map II**) (top, 3108′ B.)	1	324
Shale, gray, "fire clay"	3	327
Sandstone, fine-grained, gray to brown, thin-bedded, **Guyandot**	7	334
Concealed	40	374
Shale, black, **Skelt**	6.5	380.5
Coal, Sewell "B" (**No. 6 on Map II**)	0.5	381
Shale, sandy, gray to brown	28	409
Coal, at road forks, **Sewell "A"** (base, 3021′ B.)	2	411
Interval to **Sewell Coal** estimated	30	441

In the following section the interval between the No. 8 Pocahontas Coal and the Little Fire Creek Coal is about 30 feet less than true vertical measurement due to a comparatively strong northwest dip:

Big Clear Creek Mountain Section.

Meadow Bluff District; measured with aneroid along the public road descending the east side of the south end of Big Clear Creek Mountain, starting at a point 1.95 miles north of Rupert.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River Group (157′+)		
Concealed from top of knob	70+	70
Coal, Fire Creek, (3273′ L.) **(No. 318 on Map II)**	2.1	72.1
Concealed	29.9	102
Sandstone	7	109
Coal 0.5′; Shale 2.5; Sandstone conglomerate 2.5; **Coal** 0.5 — **Little Fire Creek** (3230′ B.) **(No. 375A on Map II)**	6	115
Sandstone, irregular-bedded, **Pineville**	37	152
Concealed	5	157
Coal blossom, No. 8 Pocahontas (3188′ B.) **(No. 378A on Map II)**	......	157
Pottsville Series—Pocahontas Group (284′)		
Concealed	35	192
Sandstone, grayish-brown, micaceous	12	204
Bone, supplied from mine above road	1.3	205.3
Coal, bright 20″; **Coal, dull** 24 — **No. 7 Pocahontas** (3135′ L.) **(Mine No. 400 on Map II)**	3.7	209
Concealed and shale	36	245
Shale, black	3.5	248.5
Coal and bone, No. 6 Pocahontas (3093′ L.) **(No. 437 on Map II)**	2.5	251
Concealed and shale	14.8	265.8
Coal, No. 5 Pocahontas (3078′ B.) **(No. 468 on Map II)**	0.2	266
Shale, sandy	18	284
Coal, No. 4 Pocahontas (3058′ B.) **(No. 477 on Map II)**	2	286
Shale, fire clay	1.5	287.5
Concealed and shale	22.5	310
Coal, No. 3 Pocahontas (3033′ B.) **(No. 494 on Map II)**	1	311
Shale, fire clay	1	312
Concealed and shale	114	426
Sandstone, massive, fine-grained, micaceous, zone of carbonized plants, near base	10	436
Concealed	5	441
Mauch Chunk Series (521′+)		
Shale, red (top, 2913′ B.)	5	446
Shale, variegated	5	451
Concealed	10	461
Sandstone, fine-grained, green, shaly at base	10	471
Coal, very impure	0.8	471.8
Shale, fire clay	1.2	473
Shale, green	8	481
Shale, red	2	483
Sandstone, green to yellow	2	485
Shale, sandstone, and concealed to Rupert	477	962

Little Clear Creek Section.

Meadow Bluff District; measured with aneroid, starting at the point where the fire trail leaves the top of Little Clear Creek Mountain and continuing southwestward with the trail to Little Clear Creek. The intervals above the No. 6 Pocahontas Coal are too great, there being a dip of about 75 feet as shown by the contours on Map II. The intervals below the coal represent nearly true vertical measurements. Arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (420′+)		
Sandstone medium-grained, gray, irregular bedding, (top, 3400′ B.) **Pineville**	50	50
Concealed	70	120
Sandstone, fine-grained	5	125
Concealed	50	175
Coal blossom, **No. 6 Pocahontas?** (3225′ B.) (**No. 461 on Map II**)	......	175
Concealed	5	180
Sandstone, brown, fine-grained	5	185
Concealed	75	260
Sandstone	8	268
Concealed	6	274
Sandstone, coarse-grained, gray to brown	2	276
Coal, No. 3 Pocahontas (top, 3125′ B.) (**Prospect No. 488 on Map II**)	4+	280
Shale, "fire clay," numerous fossil rootlets	2—	282
Shale, sandy, numerous fossil rootlets	4	286
Sandstone, fine-grained, massive at top, thin-bedded at base	19	305
Concealed	70	375
Sandstone, argillaceous	5	380
Concealed	5	385
Black slate, traces, with "fire clay"	......	385
Concealed	35	420
Mauch Chunk Series (480′+)		
Concealed to Little Clear Creek	480	900

The following record of a boring 1 mile south of Duo is included in this Chapter because of its prime stratigraphic importance:

Raine Lumber and Coal Company Coal Test Boring No. 5—No. 6 on Map II

Meadow Bluff District; on Shellcamp Ridge, one mile south of Duo; elevation, 3630′ L.

	Thickness. Ft.	In.	Total Ft.	In.
Pottsville Series—New River Group (537′+)				
Surface	12	6	12	6
Fire clay	4	6	17	0
Shale, dark, soft	4	0	21	0

			Thickness. Ft.	In.	Total Ft.	In.
Sandstone, **Lower Guyandot**			5	6	26	6
Shale, dark			14	6	41	0
Shale, dark, sandy			12	0	53	0
Shale, dark			19	6	72	6
Slate, black, **Hartridge Black Shale**			2	6	75	0
Slate, black, and **coal**	0′ 3″	**Sewell** (3551′)	4	3	79	3
Coal	0 3					
Coal and slate	0 2					
Coal	3 7					
Shale, dark			8	4	87	7
Coal, dirty			0	11	88	6
Fire clay, soft			4	0	92	6
Sandstone, hard, **Welch and Upper Raleigh**			77	6	170	0
Shale, gray, sandy			38	0	208	0
Shale, dark			21	0	229	0
Slate			2	3	231	3
Coal	1′ 1″	**Little Raleigh**	4	1	235	4
Coal and slate	0 4					
Slate	0 3					
Coal and slate	1 6					
Fire clay	0 3					
Fire clay, with **coal**	0 8					
Fire clay, soft			0	6	235	10
Shale, gray, sandy			22	2	258	0
Sandstone, hard	6′ 0″	**Lower Raleigh Sandstone**	43	0	301	0
Shale, gray, sandy	16 0					
Sandstone, hard	21 0					
Shale, dark			26	0	327	0
Slate, black			4	0	331	0
Coal	0′ 8″	**Beckley** (3298′)	1	0	332	0
Fire clay and **coal**	0 4					
Fire clay, light, sandy			4	10	336	10
Sandstone, and shale			7	2	344	0
Sandstone, hard, **Quinnimont**			75	6	419	6
Sandstone, hard, and shale, mixed, **Fire Creek Coal**, horizon?			9	0	428	6
Sandstone, hard			26	6	455	0
Sandstone, and shale mixed, **Little Fire Creek Coal** horizon?			6	0	461	0
Sandstone, hard, **Pineville**			75	0	536	0
Shale, dark			0	9	536	9
Pottsville Series—Pocahontas Group (70′ 3″)						
Sandstone, hard	13′ 0″	**Flattop and Pierpont Sandstones**	60	3	597	0
Shale, dark	0 6					
Sandstone and dark shale mixed	1 6					
Sandstone, hard	42 9					
Sandstone and **coal** spars	1 0					
Sandstone, hard	1 6					
Shale, dark, sandy			4	0	601	0
Coal	1′ 5″	**No. 6 Pocahontas** (3027′)	2	4	603	4
Sulphur streak	0 1					
Coal	0 7					
Shale and **coal** spar	0 3					
Shaly clay, dark			3	8	607	0

A comparison of the following measured section with the record of the coal test boring above illustrates some of the variations in lithology found in the Pottsville within short distances:

Duo Section.

Meadow Bluff District; measured with aneroid, starting just above Duo and continuing along the road southwestward down the mountain to the C. & O. Railroad tracks. The measurements are slightly greater than true vertical due to a dip of about 25′. Arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River Group (277′)		
Coal blossom, Sewell "A" (3470′ B.) (No. 8 on Map II)	......	....
Sandstone, brown, irregular bedding, Lower Guyandot	10	10
Shale, brown to gray	27	37
Shale, black, Hartridge	8	45
Coal, Sewell, at old opening (No. 150 on Map II) (base, 3422′ L.)	3.5	48.5
Shale, grayish-brown and concealed	25.5	64
Coal, Welch (3395′ B.)	1	65
Sandstone, tough, grayish-white, abundant plants, some standing	5	70
Shale, gray to brown, sandy, fissile and concealed	27	97
Sandstone, brown, irregular bedding at base, Upper Raleigh	35	132
Shale, gray, fissile, 1″ beds, iron-stained	25	157
Sandstone, brown, fine-grained, shaly	10	167
Concealed, shale talus	35	202
Sandstone, gray to brown, massive, medium-grained	10	212
Shale, variegated	10	222
Shale, dark to black, iron-stained, fissile	5	227
Shale, brown, sandy, and concealed	40	267
Sandstone, gray to pink, medium-grained, massive, to C. & O. railroad track at 3190′ B	10	277

The following coal test boring gives much information about the rocks in the upper half of the New River Group:

Raine Lumber and Coal Company Coal Test Boring No. 4—No. 7 on Map II.

Meadow Bluff District; one mile east of Duo; elevation, 4015′ L.

	Thickness. Ft.	In.	Total Ft.	In.
Pottsville Series—New River Group (489′+)				
Surface	10	0	10	0
Shale, dark, soft	20	0	30	0
Slate, black, Iaeger "B" Coal horizon (?)	1	2	31	2
Light clay shale	5	0	36	2

		Thickness. Ft. In.	Total Ft. In.
Sandstone, shale streaks..26′ 10″ Shale, dark, sandy.............. 4 0 Sandstone, broken...............10 0 Sandstone, shale streaks..46 0	Lower Nuttall	86 10	123 0
Coal .... 0′ 6″ Fire clay................................ 0 6 Shale, gray, sandy................ 9 0 Slate .... 0 10 Coal 0 3	Iaeger "A"..	11 1	134 1
Fire clay, soft		4 5	138 6
Shale, dark, with sandstone streaks		11 6	150 0
Shale, dark		5 6	155 6
Sandstone		1 4	156 10
Shale, dark, sandy		17 2	174 0
Shale, dark		9 6	183 6
Coal, Hughes Ferry (3831′)		0 10	184 4
Fire clay, sandy		3 0	187 4
Sandstone, dark shale streaks, Middle Iaeger		27 8	215 0
Shale, dark		17 0	232 0
Fire clay, soft, Lower Iaeger Coal horizon (?)		4 6	236 6
Sandstone, Lower Iaeger		23 0	259 6
Shale, dark, sandstone streaks		7 6	267 0
Coal		0 3	267 3
Fire clay, dark		3 3	270 6
Shale, gray, sandy, with sandstone streaks		57 2	327 8
Sandstone		1 1	328 9
Coal, Castle (3685′)		1 3	330 0
Fire clay		3 7	333 7
Shale, gray, sandy		1 0	334 7
Sandstone ....34′ 0″ Sandstone, with shale streaks 3 5	Guyandot ...	37 5	372 0
Shale, dark, soft		13 6	385 6
Sandstone		5 3	390 9
Shale, dark, soft		14 3	405 0
Sandstone, soft		4 0	409 0
Shale, dark, soft		14 0	423 0
Slate, black		3 6	426 6
Bone .... 0′ 4″ Coal 1 8	Sewell "A"......	2 0	428 6
Fire clay		4 6	433 0
Shale, dark		31 0	464 0
Slate, Hartridge Black Shale		15 6	479 6
Coal .... 0′ 3 ″ Black slate.................... 0 0½ Coal .... 3 0½ Coal and slate.............. 0 1½	Sewell (3532′)	3 5½	482 11½
Fire clay, dark		1 0½	484 0
Fire clay, shaly		5 0	489 0

Gauley Coal Land Company Coal Test Boring No. 30—No. 5E on Map II.

Meadow Bluff District; three-fourths mile west of Beech Knob; reported elevation, 3832′ R.

	Thickness. Ft.	In.	Total Ft.	In.
Pottsville Series—New River Group (387′)				
Surface	13	6	13	6
Sandstone, **Lower Nuttall**	19	0	32	6
Shale, dark, sandy	30	0	62	6
Fire clay, shaly	6	0	68	6
Shale, dark, sandy	16	6	85	0
Shale, dark, soft	25	6	110	6
Slate, black	0	4	110	10
Coal, dirty, **Hughes Ferry**	1	3	112	1
Fire clay	1	0	113	1
Sandstone, **Middle Iaegar**	19	6	132	7
Shale, dark, sandy	15	0	147	7
Shale, gray	15	6	163	1
Coal, Lower Iaeger	0	1	163	2
Fire clay	3	4	166	6
Shale, gray, sandy, **Lower Iaeger**	25	6	192	0
Sandstone, hard, **Harvey Conglomerate**	58	11	250	11
Coal	0	1	251	0
Sandstone	10	2	261	2
Coal, Castle?	0	4	261	6
Fire clay	1	6	263	0
Sandstone and shale......18′ 0″ / Sandstone ......21 0 } **Guyandot**	39	0	302	0
Shale, dark	15	9	317	9
Shale, sandy	15	0	332	9
Shale, gray	6	6	339	3
Shale, dark	2	0	341	3
Coal, Sewell "A"	1	3	342	6
Shale, dark, gray	36	0	378	6
Coal, Sewell (elevation reported 3450′)	3	5	381	11
Fire clay, sandy	5	1	387	0

The following record of a coal test boring furnishes important data concerning the character of the Pottsville rocks, below the Sewell Coal, in the general vicinity of Grassy Knob. In addition it is an important link in the chain of evidence establishing the correlation of the coal beds on Little Clear Creek Mountain. The measurements shown in this record as well as those shown in the record of boring No. 13, immediately following No. 11, must be used with caution. Unfortunately the cores were not always cut at right angles to the bedding-planes of the formations penetrated. Only parts of the cores were found but they showed a variation of 3° to 20° off vertical. The harder sandstone beds caused the greater migration:

Raine Lumber and Coal Company Coal Test Boring No. 2—No. 11 on Map II.

In Meadow Bluff District; four and one-half miles east of Duo and one mile east of Job Knob; elevation, 1010' L.

			Thickness. Ft.	In.	Total Ft.	In.
Pottsville Series—New River Group (557'+)						
Surface			16	0	16	0
Shale, soft, brown			14	0	30	0
Shale, gray			12	0	42	0
Slate, **Hartridge**			8	2	50	2
Coal, Sewell (3957')			3	2	53	4
Fire clay			0	6	53	10
Shale, light clay, sandy			5	2	59	0
Sandstone, hard, **Welch?**			32	0	91	0
Coal, Welch?			1	6	92	6
Sandstone and **coal**			0	6	93	0
Sandstone, hard			5	6	98	6
Shale, dark, soft			8	6	107	0
Coal and slate mixed, **Welch?**			2	8	109	8
Fire clay			2	0	111	8
Shale, sandy, hard	14' 4"	**Upper Raleigh**	34	4	146	0
Sandstone, hard	20 0					
Shale, gray			7	9	153	9
Slate, with **coal** spars	3' 6"	**Little Raleigh "A"**	9	11	163	8
Slate	5 0					
Coal	0 6					
Slate	0 5					
Coal	0 6					
Fire clay			7	4	171	0
Shale, dark			11	5	182	5
Slate			1	5	183	10
Slate, with **coal** spars	0' 10"	**Little Raleigh**	11	2	195	0
Fire clay, soft	5 0					
Gray clay shale	4 10					
Slate, black	0 4					
Coal	0 2					
Fire clay			0	10	195	10
Shale, gray, sandy			33	2	229	0
Shale, dark			7	0	236	0
Coal and slate			0	5	236	5
Fire clay			4	7	241	0
Sandstone, hard, white, **Lower Raleigh**			23	0	264	0
Shale, dark			10	3	274	3
Coal			0	3	274	6
Shale, gray, sandy			14	0	288	6
Shale, dark			10	0	298	6
Fire clay, sandy			4	6	303	0
Shale, dark			23	6	326	6
Slate, black			7	0	333	6
Coal, bony	0' 1"	**Beckley**	4	6	338	0
Fire clay and shale	3 7					
Coal	0 2					
Fire clay	0 2					
Coal	0 1					
Bone **coal**	0 5					

	Thickness. Ft.	In.	Total Ft.	In.
Shale, dark	14	6	352	6
Coal	0	1	352	7
Gray clay shale	2	5	355	0
Shale, dark, sandy	13	6	368	6
Slate, black	1	0	369	6
Fire clay	1	6	371	0
Shale, dark, sandy	14	0	385	0
Shale, dark	1	4	386	4
Coal, bony	1	4	387	8
Fire clay, shaly	12	0	399	8
Shale, gray	8	8	408	4
Slate, with coal spars	1	1	409	5
Shale, gray	28	7	438	0
Sandstone, hard	8	8	446	8
Coal and slate mixed, Fire Creek?	0	6	447	2
Shale, dark, sandy	18	0	465	2
Bone coal, Little Fire Creek?	0	1	465	3
Shale, dark	4	0	469	3
Sandstone, hard 40′ 0″; Shale, dark 2 0; Sandstone 7 9; Shale, dark 0 10; Sandstone 12 2 — Pineville	62	9	532	0
Shale, dark	2	2	534	2
Slate, black	2	0	536	2
Slate, black, bony	1	0	537	2
Coal, dirty 0′ 4″; Fire clay 0 1; Slate, soft 0 2; Coal 0 4 — No. 9 Pocahontas	0	11	538	1
Slate, soft	0	2	538	3
Fire clay, shaly	1	3	539	6
Shale, gray	10	0	549	6
Slate, black, No. 8 Pocahontas Coal horizon	0	6	550	0
Fire clay	0	10	550	10
Shale, gray, sandy	6	2	557	0

Pottsville Series—Pocahontas Group (271′)

	Ft.	In.	Ft.	In.
Sandstone and shale 6′ 0″; Sandstone, hard 79 0 — Flattop and Pierpont	85	0	642	0
Coal, No. 6 Pocahontas	0	10	642	10
Sandstone with coal spars and shale spots	4	8	647	6
Shale, sandy	2	6	650	0
Sandstone, Eckman	51	0	701	0
Coal and sandstone 0′ 5″; Sandstone, with coal spars 2 4 — No. 4 Pocahontas?	2	9	703	9
Dark clay shale	0	10	704	7
Fire clay, soft	2	8	707	3
Shale, gray, sandy	4	9—	712	0
Sandstone, with coal spars, Upper Pocahontas	30	0	742	0
Shale, sandy	2	0	744	0
Shale, dark	9	0	753	0
Slate, black, No. 3 Pocahontas Coal horizon	5	6	758	6
Fire clay	1	6	760	0

	Thickness. Ft.	In.	Total Ft.	In.
Shale, sandy and sandstone, **Lower Pocahontas Sandstone?**	17	0	777	0
Slate, black, **No. 2 "A" Pocahontas Coal horizon?**	0	11	777	11
Fire clay, soft	1	7	779	6
Shale, gray, sandy	3	0	782	6
Sandstone and shale	6	6	789	0
Shale, dark	8	0	797	0
Slate, black, **No. 2 Pocahontas Coal horizon**	5	0	802	0
Fire clay, sandy	6	0	808	0
Sandstone and shale mixed	5	6	813	6
Slate, black, **No. 1 Pocahontas Coal horizon**	2	6	816	0
Sandstone and shaly clay	12	0	828	0
Mauch Chunk Series (11′+)				
Fire clay, hard	0	6	828	6
Shale, green	10	6	839	0

The following record of a coal test boring confirms the correlation of the coal beds on Little Clear Creek Mountain. As noted in the comment preceding coal test boring No. 11 above, the measurements shown in this record must be used with caution:

Gauley Coal Land Company Coal Test Boring No. 1—No. 13 on Map II.

Meadow Bluff District; six miles north 77° E. of Anjean, on Little Clear Creek Mountain; elevation, 3808′ L.

	Thickness. Ft.	In.	Total Ft.	In.
Pottsville Series—New River Group (175′+)				
Surface	15	6	15	6
Shale, gray	0	4	15	10
Sandstone, hard 33′ 8″; Sandstone, with shale spots 1 0; Sandstone, hard 5 6 — **Quinnimont**	40	2	56	0
Coal, Fire Creek?	0	2	56	2
Sandstone and **coal** spars	2	6	58	8
Sandstone	1	4	60	0
Shale, gray, soft	7	4	67	4
Black slate, soft, **coal** spars	0	10	68	2
Fire clay, soft	1	2	69	4
Shale, gray, soft, broken	2	8	72	0
Shale, gray, sandy	3	0	75	0
Sandstone, fine-grained, **Pineville**	60	8	135	8
Shale, dark, sandy	8	4	144	0
Sandstone, hard, coarse	12	7	156	7
Shale, gray	3	5	160	0
Shale, dark	2	6	162	6
Coal, dirty	0	5	162	11

	Thickness. Ft.	In.	Total Ft.	In.
Clay shale, with fossils	1	0	163	11
Shale, gray, sandy	11	1	175	0
Pottsville Series—Pocahontas Group (330′ 6″)				
Sandstone, hard, fine-grained, **Flattop**	33	3	208	3
Shale, dark	1	1	209	4
Sandstone	2	10	212	2
Slate, black	0	7	212	9
Bone **coal, No. 7 Pocahontas**	0	1	212	10
Clay, shale, gray	0	10	213	8
Shale, gray, sandy	15	0	228	8
Sandstone ....11′ 10″; Sandstone, occasional **coal** spars........10 6; Sandstone, with **coal** spars and shale........ 1 4 } **Pierpont**	23	8	252	4
Shale, gray	6	0	258	4
Shale, soft, **Royal?**	2	0	260	4
Bone **coal**........ 0′ 2″; **Coal**........ 2 5; Bone **coal**........ 0 1½; **Fire** clay........ 0 6; **Coal**........ 0 3; **Slate**........ 0 0½; **Coal**........ 0 0½ } **No. 6 Pocahontas**	3	6½	263	10½
Fire clay, dark	1	0½	264	11
Shale, gray	15	6	280	5
Coal	0	6	280	11
Shale, gray, sandy	13	1	294	0
Slate, with **coal** spars	0	3	294	3
Clay shale	10	6	304	9
Shale, gray	8	6	313	3
Shale, gray, sandy	15	7	328	10
Slate, gray	0	5	329	3
Coal	0	8	329	11
Fire clay, dark	1	5	331	4
Shale, dark	2	4	333	8
Coal	0	9	334	5
Fire clay	2	2	336	7
Shale, gray	12	3	348	10
Fire clay	1	4	350	2
Shale, gray, sandy	3	8	353	10
Sandstone, **Upper Pocahontas**	30	0	383	10
Shale, dark	1	0	384	10
Bone **coal, No. 3 Pocahontas**	0	1	384	11
Shale, dark	4	7	389	6
Fire clay, soft	2	8	392	2
Shale, dark	20	4	412	6
Shale, dark, sandy and sandstone, **Lower Pocahontas Sandstone?**	22	0	434	6
Shale, dark	10	6	445	0
Sandstone, hard, fine, **coal** spars	2	9	447	9
Shale, dark	1	4	449	1
Sandstone, hard, with shale fossils	3	2	452	3
Sandstone, hard	2	9	455	0

	Thickness. Ft.	In.	Total Ft.	In.
Shale, dark, sandy	14	0	469	0
Shale, dark	7	0	476	0
Slate, soft	3	6	479	6
Bone coal, No. 2 Pocahontas?	0	2	479	8
Shale, dark	0	8	480	4
Fire clay, sandy	2	8	483	0
Shale, dark, sandy	10	4	493	4
Slate, black	0	6	493	10
Dark clay shale	0	10	494	8
Coal, No. 1 Pocahontas?	0	6	495	2
Fire clay	2	3	497	5
Shale, gray	2	3	499	8
Sandstone	3	10	503	6
Shale, gray	2	0	505	6
Mauch Chunk Series (35′ 6″+)				
Fire clay and gray and green shale mixed	12	0	517	6
Gray and green and red shale mixed	6	9	524	3
Fire clay, hard, sandy	5	2	529	5
Fire clay and green shale	1	4	530	9
Red and gray and green shale mixed	8	3	539	0
Red shale	2	0	541	0

The following section and well record, with remarks about the same, by D. B. Reger, are taken from the Nicholas County Report, W. Va. Geological Survey, pp. 174 to 177; 1921. It provides much information on the subsurface strata of southeastern Nicholas and western Greenbrier Counties;

"In the following section, arranged in descending order the surface portion was measured with aneroid, starting at the top of the plateau just east of Snow Hill School, and extends northeastward with the strike of the rocks along the public highway to an opening in the Sewell Coal at the foot of the mountain, one-third mile west of Hominy Creek. The lower portion is the record of the Gauley Coal Land Company (Granville O'Dell) No. 1 Oil Test Well (No. 8 on Map II) located just west of Hominy Creek, and 1.4 miles southward from Hominy Falls, and being 0.4 mile northwest of the foot of the measured section. Inasmuch as the Sewell Coal is opened within a few feet of the well and only 7 feet above the level of the top of the hole, no difficulty was experienced in making connection with the stratigraphic measurement described above. The well was drilled by the Wick-Laing Oil and Gas Company, its record having been furnished by Mr. C. M. Boyd, Secretary, of Youngstown, Ohio. It was abandoned as a dry hole, only a small amount of gas having been found in the Princeton Sandstone:"

Hominy Falls Section, Wilderness District, Nicholas County.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River Group (1057′)		
Sandstone, massive, from road fork, Upper Nuttall	75	75
Shale, black	10	85

	Thickness. Feet.	Total. Feet.	
Fire clay, streak, (Iaeger "B" Coal horizon) (2870′ B.)	......	85	
Sandstone, massive, coarse, soft, Lower Nuttall	115	200	
Concealed	40	240	
Spring, Hughes Ferry Coal horizon (2710′ B.)	......	240	240′
Slate, black	15	255	
Concealed and shale	25	280	
Sandstone, Harvey	40	320	
Concealed	60	380	
Sandstone, massive, Guyandot, and concealed in steep bank	143	523	
Shale, dark, Hartridge	2	525	
Coal, soft 2′ 4″; Slate, bony 0 7; Coal, bony 1 6; Coal, soft, good 0 8 — (5′ 1″) Sewell (2420′ L.)	5	530	290′
Sandstone and concealed to stratigraphic level of Well (8)	7	537	

Continued by Gauley Coal Land Company (Granville O'Dell) No. 1 (No. 8 on Map II) Well Record:

	Thickness. Feet.	Total. Feet.
Conductor	16	553
Slate shell (hole full of water at 20′)	64	617
Coal Blossom, Welch?	2	619
Slate, black	148	767
Sand, gray, Lower Raleigh	20	787
Lime, white	30	817
Coal, Beckley?	5	822
Slate, shell, dark (hole full of water at 304′)	68	890
Coal, Fire Creek?	5	895
Slate, dark	7	902
Lime, gritty (hole full of water at 385′)	55	957
Slate, dark	15	972
Lime, dark, hard	65	1037
Sand, gray, hard, Pineville (hole full of water at 510′)	20	1057
Mauch Chunk Series (1418′)		
Red rock	120	1177
Sand, gray, hard, Princeton (gas at 694′, steel-line measure)	140	1317
Slate and shells, dark	175	1492
Red rock and lime shells	75	1567
Red rock lime shells	125	1692
Lime shells	25	1717
Lime shells, red rock	75	1792
Lime, gritty, Terry?	40	1832
Sand, very hard	45	1877
Slate, soft	15	1892
Lime, very hard	20	1912
Slate, soft	6	1918
Lime, very hard	12	1930
Slate, soft	10	1940
Lime, broken up	15	1955
Slate, white	10	1965
Slate	30	1995

	Thickness. Feet.	Total. Feet.
Lime, hard	13	2008
Slate	10	2018
Sand, **Maxton**	39	2057
Slate, soft	12	2069
Slate and lime, broken up	118	2187
Lime, white 102′; Slate, white 15; Lime 98 — **Hinton** (Little Lime)	215	2402
Sand, **Webster Springs**	35	2437
Slate, black	5	2442
Sand	13	2455
Pencil Cave	20	2475
Greenbrier Series (393′)		
Big Lime	393	2868
Pocono Series (311′)		
Sand, **Keener**	12	2880
Red rock	3	2883
Sand, **Big Injun**	16	2899
Slate	49	2948
Squaw Sand	19	2967
Sand shells	110	3077
Sand, **Berea**	102	3179
Catskill and Chemung Series (1111′)		
Lime shells, slate	363	3542
Lime	20	3562
Shells and slate	85	3647
Lime	60	3707
Slate and shells	150	3857
Lime, gritty	125	3982
Lime, gritty, and shells (steel-line measure)	308	4290

Began spudding, October 26, 1915; shut down May 11, 1916, 6 p. m.

10″ casing, 345′; 8¼″ casing, 975′; 6⅝″ casing, 1658′.

Total depth of hole 3753

Kieffer Section.

Meadow Bluff District; starting at the edge of Cross Mountain; descending to Beaver Creek; measured with aneroid along road and arranged in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Princeton Group (35′)		
Conglomerate, massive, white 15′; Rotten sand and pebbles 10; Concealed 10 — **Princeton Conglomerate** (top, 2875′)	35	35
Mauch Chunk Series—Hinton Group (300′+)		
Concealed, with red and olive shale	100	135
Shale, red	75	210
Sandstone, greenish-yellow, shaly, cross-bedded	25	235
Shale, red	80	315
Shale, yellow, **Avis**	10	325
Limestone, **Avis**, yellow, shaly, fossiliferous (top 2550′)	10	335

MEASURED SECTIONS, WILLIAMSBURG DISTRICT.

Williamsburg District joins Meadow Bluff District on the northeast and east. It is shaped somewhat like an hour-glass with the narrow part at Grassy and Cold Knobs. The fan-shaped northwest end of the district includes the drainage area of Laurel Creek and Little Laurel Creek extending from Beech Ridge on the south to Sugar Knob on the north. The southern half of the district is centered on the town of Williamsburg and includes most of the drainage area of Sinking and Culverson Creeks. The outcropping rocks range from the New River Group of the Pottsville down to the top of the Pocono.

In the following record the Hinton Group of the Mauch Chunk appears to be too thin, due, no doubt, to a northwest dip:

Roach Run Section.

Williamsburg District; measured along the road on southeast end of Cross Mountain near Roach Run; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluestone Group (90′+)		
Sandstone, grayish-brown, weathers white (base, 3125′ B.)	15	15
Shale, brown to yellow, and concealed	75	90
Mauch Chunk Series—Princeton Group (25′)		
Sandstone, **Princeton**, gray, massive, conglomerate	25	115
Mauch Chunk Series—Hinton Group (520′)		
Concealed	15	130
Shale, buff, sandy	40	170
Shale, red	80	250
Sandstone, grayish-brown, flaggy, shaly at base	10	260
Shale, red, sandy	50	310
Sandstone, wellow to olive, calcareous, shaly......10′ Limestone, blue, banded, shaly......10 Shale, yellow, fissile...... 5 **Avis Limestone** (Coll. 132) (top, 2830′ B.)	25	335
Shale, red	40	375
Sandstone, reddish-brown, massive, cross-bedded	35	410
Shale, red and concealed	190	600
Sandstone, **Stony Gap**, reddish-brown at top, more massive and grayish-brown at base	35	635
Mauch Chunk Series—Bluefield Group (280′+)		
Shale, red	20	655
Sandstone, reddish-brown	5	660
Shale, red, brown, and concealed to road forks, (elevation, 2225′ L.)	255	915

Cold Knob—Hinkle Well Section.

Williamsburg District; starting at the top of Cold Knob and traversing generally southward 2 miles to the S. W. Hinkle well **No. 4 on Map II** and combined with the log of that well; measurements for that portion of the Bluefield Group above the Hinkle well are slightly greater than true vertical owing to the dip of the rocks; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Pottsville Series (315′+)		
Concealed from top of Cold Knob, not examined in detail	315	315
Mauch Chunk Series—Bluestone Group (395′)		
Shale, red and concealed (top, 4030′ B.)	15	330
Shale, red, variegated, with thin flaggy, greenish, argillaceous sandstones	380	710
Mauch Chunk Series—Princeton Group (80′)		
Sandstone, greenish-brown, massive, many quartz pebbles, mostly concealed, but abundant drift, **Princeton Conglomerate** (top, 3635′ B.)	80	790
Mauch Chunk Series—Hinton Group (475′)		
Shale, red, and concealed	25	815
Sandstone, greenish-gray, calcareous, thick-bedded, hard	20	835
Shale, variegated, interbedded with green to red argillaceous sandstones, and concealed	110	945
Limestone, argillaceous, fossiliferous, **Avis** (top 3400′ B.)	15	960
Shale, red, with brown to green sandstones, partly concealed	270	1230
Sandstone, reddish-brown, cross-bedded, medium-hard, **Stony Gap** (top, 3115′ B.)	35	1265
Mauch Chunk Series—Bluefield Group (935′)		
Shale, red, variegated, with argillaceous, green to brown sandstones, and concealed to top of **Hinkle Well**	545	1810
(Continued with record of Hinkle Well No. 4 on Map II—elevation, 2535′ B.):		
Soil	5	1815
Sandstone, **Droop**	125	1940
Shale, blue	70	2010
Shale and sand, **Webster Springs**	45	2055
Shale, gray	145	2200
Greenbrier Series (475′)		
Shale and lime (top, 2145′ B.)	5	2205
Lime	435	2640
Shale, blue, coarse, and some lime	35	2675
Maccrady Series (80′)		
Shale, red ½, gray ½	55	2730
Shale, red ½, gray ½	25	2755
Pocono Series (205′)		
Shale, black, and gray limy sand	105	2860
Gray lime	40	2900
Lime	35	2935
Lime and yellow	25	2960

	Thickness. Feet.	Total. Feet.
Catskill Series (50′)		
Red rock	50	3010
Chemung Series (400′+)		
Dark fine sand lime, fairly good sand	175	3185
Sand, gray, coarse	45	3230
Lime and coarse sand	5	3235
Sand, light, hard, gray	15	3250
Lime, light, hard and gray	24	3274
Sand, gray, soft (some water)	11	3285
Sand, gray, hard	15	3300
Lime, shale	35	3335
Lime, black, hard	18	3353

Alta Section.

Williamsburg-Blue Sulphur District line; starting 1½ miles west of Alta and measured southeastward along the Midland Trail; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group, (293′+)		
Sandstone, **Droop**, brown to grayish-white, massive, cross-bedded, makes cliff at quarry	50	50
Shale, yellow, fissile (Coll. 69 at base)	50	100
Limestone, **Reynolds**, shaly (Coll. 68)	3	103
Shale, yellow, sandy, fissile, thin streaks of red	30	133
Limestone, gray, hard, cut with calcite veins ... 10′ } Glenray (Coll. 73)		
Limestone, tough, siliceous ... 10 }	60	193
Limestone, blue, hard, broken ... 40 }		
Shale, **Lillydale**, dark, carbonaceous, fissile, micaceous, plants and pelecypods at base (Colls. 70, 72)	100	293
Greenbrier Series (610′)		
Limestone, **Alderson**, bluish-gray, siliceous, upper part shaly (Coll. 80), lower part more massive (Coll. 79)	40	333
Shale, **Greenville**, yellowish-green to dark (Coll. 78)	10	343
Limestone, blue, hard, massive, some oolite, very fossiliferous, upper part; light-gray to white oolite in lower part; stylolitic; abundant marine fossils; (Coll. 77 from upper part); (Coll. 76 from lower part) ... 120′ } Union	195	538
Limestone, bluish-gray, massive ... 75 }		
Shale, dark to yellow (Coll. 75) ... 10′ } Pickaway	135	673
Limestone, gray, massive, loose chert, fragments (Coll. 74 near base) ... 125 }		
Shale, yellow, sandy, few fossils	40	713
Limestone, yellowish-gray, weathers yellow, mud-cracks, (photograph, Plate XXI) ... 15′ } Taggard	35	748
Limestone, light-gray ... 10 }		
Limestone, red, shaly, sandy ... 10 }		

	Thickness. Feet.	Total. Feet.
Limestone, light-gray, stylolitic structure, fossiliferous, (quarry, average dip, 23° N. W.)....25′ Limestone, dark-gray, massive....50 — Patton and Sinks Grove	75	823
Limestone, Hillsdale, blue, gray, massive, nodules of irregular black chert (Coll. 71)	80	903
Maccrady Series (75′±)		
Shale, red	75±	978

MEASURED SECTIONS, FALLING SPRINGS DISTRICT.

Falling Springs is the northernmost district in the county. It includes most of the drainage area of North and South Forks of Cherry River, most of the drainage area of Spring Creek, and the drainage area of several small streams on the east side of Greenbrier River north of the village of Anthony. The surface rocks range from the Kanawha Group of the Pottsville down to the middle Chemung. Sections measured in this district afford the best detailed measurements of the Greenbrier Limestone available in the county.

Little Rocky Run Section.

Falling Springs District; measured with aneroid starting at the top of the high knob (elevation, 4030′ L.) north of Little Rocky Run, traversing south to Little Rocky, thence westward to South Fork of Cherry River.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River and Pocahontas Groups (670′+)		
Concealed to top of bench	115	115
Sandstone, **Welch?**	20	135
Concealed	10	145
Sandstone, makes cliff....30′ Concealed .... 5 Sandstone, massive, white, with white quartz pebbles 20 — **Upper Raleigh?**	55	200
Concealed	460	660
Sandstone, coarse, conglomerate	10	670
Mauch Chunk Series (650′+)		
Concealed	120	790
Sandstone, coarse	10	800
Concealed	30	830
Shale, red, and concealed	185	1015
Sandstone, brown, **Princeton?**	50	1065
Concealed	10	1075
Shale, yellow to brown	10	1085
Shale, red	30	1115
Concealed to South Fork of Cherry River	205	1320

The following section, measured just across the county line from Sugartree Bench, together with comments about the same by P. H. Price, is taken from pages 111 to 113 of the Pocahontas County Report[5]. It is now believed that approximately 150 feet should be added to the interval between the Sewell Coal and the top of the Mauch Chunk. This is in addition to the amount to be added to the Mauch Chunk as noted in the comment.

"The following section, measured by the writer and arranged in descending stratigraphic order, affords a view of the basal Coal Measures including the **Sewell Coal.** A complete section of the Mauch Chunk Series was measured by aneroid, using vertical measurements on rising strata, thus shortening its true thickness by approximately 400 feet. An attempt was made to reopen the Sewell Coal here at the prospect of the Preston Clark Heirs, from which considerable coal was mined several years ago. In order to get a true thickness several hours were spent by the writer, Walter Mason, and Lee Clark, one of the heirs, in facing up the coal as indicated below:"

Briery Knob Section.

Pocahontas County, Little Levels District; beginning at high point on Briery Knob and following southeastward along the old coal road to forks near Mt. Lebanon Church and thence northeastward to Hills Creek.

	Thickness. Feet.	Total. Feet.
Pottsville Series—New River Group (431′)		
Sandstone, (**Harvey Conglomerate**), grayish-brown, weathering almost white, coarse	15	15
Concealed in flat bench	90	105
Sandstone, **Guyandot**, white, weathering to white sand, coarse; small, white quartz pebbles	55	160
Shale, **Hartridge**, mostly concealed, but 4′ of dark carbonaceous shale with plants and **Naiadites?** visible	35	195
Coal, good, clean....2′ 4″ Shale ....1 10 **Coal**, good, clean....1 3 **Coal**, concealed....1 0 Concealed .... } (6′ 5″) **Sewell**, Preston Clark Heirs Prospect (**No. 11 on Map II**)	6.4	201.4
Concealed, flat bench	24.6	226
Sandstone, **Upper Raleigh (Sharon)**, brown and white, coarse, cross-bedded, with white quartz pebbles	105	331
Concealed	95	426
Shale, dark, carbonaceous, **Fire Creek Coal** horizon?	5	431

[5]County Reports, W. Va. Geol. Sur., 1929.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluestone Group (297′)		
Sandstone, reddish-brown, shaly	5	436
Concealed	52	488
Concealed in flat bench	165	653
Shale, yellow	5	658
Concealed	70	728
Mauch Chunk Series—Princeton Group (50′)		
Concealed in bench but large conglomerate boulders (**Princeton Sandstone**)	50	778
Mauch Chunk Series—Hinton and Bluefield Groups (1018′)		
Shale, red	200	978
Sandstone, **Stony Gap**, red and brown, cross-bedded, makes bold cliff, shaly at top	40	1018
Shale, red	125	1143
Sandstone, grayish-brown, micaceous	25	1168
Shale, red	20	1188
Shale, partly concealed, but mostly red	250	1438
Sandstone, red	5	1443
Shale, red	105	1548
Sandstone, reddish-brown	10	1558
Shale, red	25	1583
Sandstone, red	3	1586
Shale, red, green, sandy	30	1616
Shale, yellow, olive, to road forks (2715′ B.)	40	1656
Shale, olive, dark	10	1666
Limestone, **Reynolds**, very fossiliferous, impure, shale at top	20	1686
Shale, dark, olive, sandy......35′ / Shale, red......20 / Shale, olive, sandy......30 } **Lillydale**	85	1771
Sandstone, **Edray**, grayish-brown, micaceous	25	1796
Greenbrier Series (210′+)		
Limestone, **Alderson**, massive, gray, fossiliferous	10	1806
Concealed	90	1896
Shale, **Greenville**, dark, carbonaceous, fossiliferous	40	1936
Concealed to Hills Creek (2465′ B.)	70	2006

Butler Mountain Section.

Falling Springs District; beginning at road forks, elevation 2729′, on north end of Butler Mountain, traversing southeast along road to ½ mile east of Rapp School; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (505′+)		
Sandstone, **Droop**, gray, medium-grained	50	50
Shale, red, brown, and concealed	215	265
Limestone, **Reynolds**, shaly	45	310
Shale and concealed, mostly reds	50	360
Limestone, light-gray, laminated	5	365
Shale, red and concealed	90	455
Sandstone, **Edray** (?), yellowish-brown, flaggy	10	465

	Thickness. Feet.	Total. Feet.
Shale, red, yellow, and concealed, **Lillydale**	40	505
Greenbrier Series—Alderson Member		
Shale, yellow calcerous (top, 2200′)	5	510
Limestone, blue, massive, **Archimedes**, crinoid stems	5	515
Limestone, shaly, grayish-blue, weathers yellow, fissile, cup corals, **Athyris**, bryozoa, **Productus** **(Coll. 113)**	10	525
Limestone, yellowish-gray, argillaceous, abundant Pentremites, crinoid stems large and small, horn corals, **Athyris**, **Spirifer pellaensis**, fenestelloids and other bryozoa **(Coll. 112)**	15	540
Limestone, gray-blue, shaly, fissile, abundant **Productus, Orbiculoidea**, and **Ambocoelia (Coll. 111)**	15	555
Limestone, blue, oolitic, crinoid stems, blastoid plates, Pentremites, horn corals	5	560
Limestone, yellowish-gray, some red, weathers to a yellow clay, plants, fish plate **(Coll. 110)**	10	570
Greenbrier Series—Union Member		
Limestone, bluish-gray, oolitic, stylolitic, massive, pure, (top, 2110′ B.)	......	....

In the following section, no division is made between the Hinton and Bluefield Groups of the Mauch Chunk Series. It is probable, however, that the grayish-brown sandstone at 2940′ B. is the Stony Gap and the base of the Hinton Group:

Cherry Low Place Section.

Falling Springs District; starting from the top of a small knob 2¼ miles north of Leonard and descending the southeast side of the mountain to Panther Camp Creek; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluestone Group (230′+)		
Knob capped by fine-grained sandstone (top, 3520′ B.)	20	20
Concealed	35	55
Shale, green, brown, sandy, crumbly	10	65
Shale, dark, carbonaceous, ostracods, pelecypods (top, 3450′ B.)	5	70
Concealed	50	120
Shale, grayish-brown (top, 3400′ B.)	5	125
Concealed	25	150
Shale, dark, carbonaceous	30	180
Concealed	40	220
Sandstone, greenish-brown, flaggy (top, 3300′ B.)	10	230
Shale, olive to brown, sandy	5	235

		Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Princeton Conglomerate (55′)			
Sandstone, greenish-brown, flaggy (top, 3285′ B.) 5′; Sandstone, brown, medium-grained, massive 20; Conglomerate, brown, porous, rotten, plants 30	**Princeton**	55	290
Mauch Chunk Series—Hinton and Bluefield Groups (530′+)			
Concealed (top, 3230′ B.)		5	295
Shale, yellow, sandy		10	305
Concealed		200	505
Limestone blocks, **Avis?** (3015′ B.)		......	505
Concealed		75	580
Sandstone, grayish-brown (top, 2940′ B.)		15	595
Shale, red, to 2850′ B.		75	670
Concealed and red shale to house at Panther Camp Creek (2710′ B., 2746′ L.)		140	810

Renicks Valley Section.

Falling Springs District; starting at the junction of Brushy Mountain and Droop Mountain, 400 feet northwest of the Pocahontas-Greenbrier County line; measured descending southeastward along the highway toward Renicks Valley; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (400′+)		
Sandstone, **Droop**, white (base, 3035′ B.)	40+	40
Shale, **Talcott and Ada**, olive-green, yellow, sandy (base, 2980′ B.)	55	95
Concealed	40	135
Shale, yellow, much weathered (2910′ B.)	30	165
Concealed	15	180
Shale, green to olive	5	185
Shale, red (2860′ B.)	30	215
Concealed	10	225
Shale, yellow, weathered	5	230
Shale, red	5	235
Concealed	15	250
Sandstone, **Edray** or **Webster Springs**, yellowish-brown, flaggy at top, massive near middle, flaggy and shaly at base (2785′ B.)	40	290
Shale, **Lillydale**, green to olive-brown, sandy and flaggy at top, fissile with concretions in lower part, exfoliate type of weathering (2735′ B.)	50	340
Shale, dark	45	385
Concealed	5	390
Shale, yellow, weathered	10	400

		Thickness. Feet.	Total. Feet.
Greenbrier Series (225′+)			
Limestone, olive-green, shaly (top, 2675′ B.) .... 3′	Alderson	95	495
Shale, olive, weathered 8			
Limestone, gray, fossiliferous 5			
Shale, gray, weathers yellow 59			
Limestone, blue, hard (top 2600′ B.) 10			
Limestone, red, shaly 5			
Limestone, gray, weathers white, stylolitic 5			
Limestone, gray, oolitic (top, 2565′ B.) .... 10′	Union	130	625
Limestone, light oolite, stylolitic 10			
Limestone, blue, gray, hard, brittle, sparse black chert 110			

Julia P. O. Section.

Falling Springs Disrict; starting 1.5 miles northwest of Julia P. O. on the top of a high knob and continuing southeastward down the highway toward Julia; arrangement in descending stratigraphic order.

		Thickness. Feet.	Total. Feet.
Greenbrier Series (551′+)			
Limestone, and concealed (top, 2565′) .... 171′	Union	200	200
Limestone, blue, massive (top, 2394′ L.) 29			
Limestone, gray to yellow, shaly (top, 2365′ B.) .... 5′	Pickaway	130	330
Limestone, light-gray 10			
Limestone, yellow (top, 2350′ B.) 20			
Limestone, dark-gray, weathers yellow, argillaceous 10			
Limestone, bluish-gray, hard, massive 30			
Limestone, blue-gray, shaly (top, 2290′ B.) 25			
Limestone, yellow, argillaceous, weathers white 2			
Limestone, light-gray, with clay seams, light-blue at base 28			
Limestone, red, shaly (top, 2235′ B.) 2′	Taggard	25	355
Limestone, light, weathers yellow.... 3			
Limestone, red, shaly 5			
Limestone, light-gray and yellow 5			
Limestone, yellowish-red 3			
Limestone, gray oolite 5			
Limestone, red, shaly 2			

		Thickness. Feet.	Total. Feet.
Limestone, light-blue, with streaks of pink and yellow, (base, 2205′ B.) 5′			
Limestone, light-gray, partly oolitic....10			
Limestone, weathers yellow.................. 5			
Limestone, grayish-blue, massive, oolitic at top..30	Patton	125	480
Limestone, light-blue, dense.................30			
Limestone, yellowish-white...................10			
Limestone, light-blue, massive, to road forks (base, 2071′ L., 2085′ B.)..35			
Limestone, light-gray............................20′			
Limestone, dark, abundant nodules of black chert.. 2	Sinks Grove	42	522
Limestone, light- blue, weathers yellow, pure, white silica geodes in base 20			
Shale, bluish-green, with red coral colonies .... 1′			
Limestone, bluish-black, abundant black chert..20	Hillsdale	29	551
Limestone, yellow.................................. 8			
Maccrady Series (3′+)			
Shale, blue, red, old soil..		3	554
Shale, red..		......	....

Renick Station.

Falling Spring District; beginning on a knoll on Falling Spring Mountain, one mile southwest of Modoc P. O. and descending east to cut in road summit, and thence southeast along highway to Renick village, thence along highway to Renick P. O. and Station; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (260′+)		
Knoll capped by olive-green sandy shale (2650′ B.)....	......	....
Concealed	35	35
Limestone, blue, hard, exposed..	2	37
Concealed	48	85
Shale, red, sandy, summit of road cut, (**Coll. 87** at base)	15	100
Limestone, **Reynolds**, gray, clayey (**Coll. 88**)................	15	115
Shale, yellow, olive, sandy..	20	135
Shale, red, sandy..	10	145
Sandstone, **Webster Springs**, grayish-brown, cross-bedded	10	155
Limestone, **Glenray**, gray, hard, cross-bedded, very fossiliferous, crinoid, blastoid, fenestelloid, Spirifer, Productus, Archimedes, Pterotocrinus, cup coral, coprolite, fish teeth (**Coll. 89**)..	15	170
Sandstone, **Edray**, yellowish-brown, spring at base, makes cliff at house..	25	195

		Thickness. Feet.	Total. Feet.
Shale, yellowish-brown, fissile............55′ Shale, dark-gray, sandy, Orthoceras, pelecypods, (Coll. 91)........................10	Lillydale	65	260
Greenbrier Series (405′+)			
Limestone, yellowish-gray, weathers yellow, cup corals, crinoid stems, brachiopods, Archimedes (Coll. 90) ....10′ Limestone, red, sandy, shaly..............25 Limestone, yellowish-gray, shaly at top, more solid at base, fossiliferous (Coll. 92).....................................50	Alderson	85	345
Limestone, blue, massive, oolitic, stylolitic ....40′ Limestone, yellow, clayey....................10 Limestone, yellowish-blue, shaly........ 5 Limestone, blue, masive......................25 Shale, yellow on weathered exposure..10 Limestone, blue, hard, abundant crinoid stems, Pterotocrinus, brachiopods, small stylolitic structure....15 Concealed at upper end of village......50 Limestone, dark, blue, massive..........30	Union	185	530
Limestone, grayish-yellow, shaly........15′ Limestone, gray, blue, massive, to post-office ....85 Concealed to railroad............................35	Pickaway	135	665

MEASURED SECTIONS, BLUE SULPHUR DISTRICT.

Blue Sulphur District is located in the southwest corner of the county and includes most of the drainage area of Muddy Creek. The outcropping rocks range from the Hinton Group of the Mauch Chunk down to the upper part of the Pocono.

Blue Sulphur Springs Section.

Blue Sulphur District; starting at a point 2 miles south of Blue Sulphur Springs along the Alderson highway; measured with aneroid southward approximately 1 mile, there being a gentle dip to the northwest; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (195′+)		
Shale, greenish-brown, fissile...	10	10
Limestone, Reynolds, blue to yellowish-blue, fossiliferous (top, 1865′ B.)...	40	50
Shale, yellow, fissile..	10	60
Shale, olive, yellow to brown, sandy, micaceous..........	15	75

	Thickness. Feet.	Total. Feet.
Limestone, **Glenray**, blue, hard, siliceous, (top, 1800′ B.)	15	90
Shale, yellowish-brown, sandy	10	100
Shale, red	10	110
Sandstone to shale, brown	25	135
Shales, sandy, brown, laminated, almost sandstone	60	195

Alum Run Section.

Blue Sulphur District; starting 1.5 miles southwest of Brushy Flat School; measured with aneroid along the highway southward, down Alum Run; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Church Series—Bluefield Group (350′+)		
Sandstone, **Droop**, grayish-brown, medium-grained, very hard, cemented with silica, iron-stained, streaks of coal and carbonized plants, ripples and cross-bedding, makes cliff (top, 2110′ B.)	75	75
Concealed	270	345
Shale, black, carbonaceous, pelecypods	5	350
Greenbrier Series (35′+)		
Limestone, yellow, shaly at top; **Archimedes**, brachiopods, cup corals, etc. (top, 1765′ B.) 5′ Limestone, grayish-blue, shaly weathers yellow; brachiopods, bryozoan, etc. 30 **Alderson**	35	385
Limestone, **Union**, gray, massive, white, weathers light-blue; **Archimedes, Pentremites**, cup corals	......	....

Blaker Mills Section.

Blue Sulphur District; starting at the top of a small hill just north of Blaker Mills; measured with aneroid southeast to Mill Creek; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (155′+)		
Shale, yellow, sandy at top (1780′ B.)	20	20
Limestone, **Glenray**, impure, fossiliferous	10	30
Shale, yellow, sandy, concretionary	100	130
Sandstone, gray, brown to reddish	5	135
Concealed (base, 1625′ B.)	20	155
Greenbrier Series (25′+)		
Limestone, **Alderson**, to creek	25	180

The following section, measured by D. B. Reger, is located just outside of Greenbrier County and in the edge of Summers County. It is reprinted from pages 256 to 258 of the Mercer, Monroe, and Summers County[6] report:

[6]County Report, W. Va. Geol. Sur., 1926.

Alderson Section.

Summers County; Talcott District; starting at the top of Keeney Knob on Keeney Mountain and traversing southeastward to Mt. Zion Church and thence southward down Possum Hollow to its junction with Greenbrier River 1.5 miles west of Alderson; dip northwest about 100 feet per mile; arrangement in descending stratigraphic order; No. 1-70, inclusive, were measured with aneroid but the apparent thicknesses of these members were increased approximately 12½ per cent., or a total of 280 feet, to show a true vertical section; Nos. 71 to 79, inclusive, were measured by separate determination or by estimate.

	Thickness. Feet.	Total. Feet.
Pottsville Series—Pocahontas Group (90'+)		
1. Sandstone, **Lower Pocahontas**, gray, forms top of Keeney Knob (3925' B.)	22	22
2. Concealed in slope, with yellow sandy soil	45	67
3. Sandstone, buff	23	90
Mauch Chunk Series—Bluestone Group (663')		
4. Shale, yellow, sandy, with plant fossils (3845' B.)	22	112
5. Sandstone, greenish-gray, flaggy (3840' B.)	6	118
6. Shale, red	73	191
7. Sandstone, brown, shaly, micaceous	17	208
8. Shale, red	62	270
9. Concealed	56	326
10. Sandstone, massive, coarse, buff, micaceous, cliff rock (3610' B.)	50	376
11. Shale, red, largely concealed, to highest road fork (2410' B.)	225	601
12. Concealed	56	657
13. Shale, variegated	28	685
14. Sandstone, shaly	11	696
15. Concealed, with dark shale, (3275' B.)	57	753
Mauch Chunk Series—Princeton Conglomerate (35')		
16. Sandstone, **Princeton**, gray, massive, coarse, pebbly (3245' B.)	35	788
Mauch Chunk Series—Hinton Group (849')		
17. Concealed	90	878
18. Shale, sandy	17	895
19. Shale, red	51	946
20. Sandstone, greenish-brown, shaly (3090' B.)	17	963
21. Shale, red, and variegated	80	1043
22. Sandstone, **Avis**, green, flaggy, cliff rock (2995' B.)	30	1073
23. Shale, red	16	1089
24. Shale, **Upper Avis**, greenish-yellow, limy, with marine fossils, pelecypods	11	1100
25. Limestone, **Avis**, steel-gray, shaly at middle, with numerous marine fossils, pelecypods, brachiopods, gastropods, crinoids, and bryozoa (2915' B.)	28	1128
26. Shale, **Lower Avis**, yellow, calcareous	33	1161
27. Shale, red	170	1331
28. Sandstone, reddish-brown, shaly (2755' B.)	11	1342
29. Shale, red	72	1414

		Thickness. Feet.	Total. Feet.
30.	Sandstone, reddish-brown, with massive layers interbedded with shale (2645′ B.)	50	1464
31.	Shale, variegated	23	1487
32.	Sandstone, shaly, reddish-brown (2595′ B.)	34	1521
33.	Shale, red, partly concealed	39	1560
34.	Sandstone, massive, reddish-brown (2550′ B.)	11	1571
35.	Shale, red and variegated	49	1620
36.	Sandstone, **Stony Gap**, massive at base, cliff rock (2490′ B.)	17	1637
Mauch Chunk Series—Bluefield Group (1202′)			
37.	Shale, calcareous, with restricted fauna; ostracods and annelids (**Spirorbis**)	6	1643
38.	Sandstone, shaly	6	1649
39.	Shale, variegated	5	1654
40.	Sandstone, shaly	11	1665
41.	Shale, variegated	28	1693
42.	Sandstone, shaly	6	1699
43.	Shale, green, sandy, partly concealed	11	1710
44.	Sandstone, greenish, massive, cliff rock (2415′ B.)	11	1721
45.	Shale, variegated and limy	37	1758
46.	Sandstone, greenish-brown, shaly at top (2372′ B.)	11	1769
47.	Shale, variegated	2	1771
48.	Limestone, yellow, shaly (2365′ B.)	6	1777
49.	Shale, variegated	9	1786
50.	Sandstone, brown, shaly	2	1788
51.	Shale, red	4	1792
52.	Limestone, yellow, earthy, and brecciated (2350′ B.)	2	1794
53.	Shale, red	11	1805
54.	Sandstone, reddish-brown, shaly (2330′ B.)	11	1816
55.	Shale, red and green	23	1839
56.	Sandstone, shaly	6	1845
57.	Shale, yellowish-green, calcareous, with marine fossils (2290′ B.), numerous pelecypods	17	1862
58.	Shale, red and variegated	39	1901
59.	Sandstone, reddish-brown, shaly (2250′ B.)	6	1907
60.	Shale, red	11	1918
61.	Shale, green	6	1924
62.	Shale, red	6	1930
63.	Sandstone, reddish-brown, shaly (2225′ B.)	6	1936
64.	Shale, red, streaked with green	88	2024
65.	Shale, sandy	40	2064
66.	Shale, red and variegated, sandy	96	2160
67.	Sandstone, shaly (2005′ B.), outcrops at Mt. Union Church	22	2182
68.	Shale, red and variegated, partly concealed	165	2347
69.	Sandstone, flaggy, cliff rock (1845′ B.)	17	2364
70.	Shale, red and variegated, partly concealed	135	2499
71.	Limestone boulders (1725′ B.)	......	2499
72.	Concealed (estimated)	50	2549
73.	Sandstone, **Droop**, shaly, cliff rock	25	2574
74.	Shale, green, sandy	15	2589
75.	Shale, green, limy, with marine fossils, brachiopods (**Spirifer pellaensis, Productus inflatus,**		

	Thickness. Feet.	Total. Feet.
etc.) and bryozoa; (estimated)	60	2649
76. Concealed, horizon of **Reynolds** Limestone (estimated)	15	2664
77. Limestone, **Glenray**, shaly and sandy (estimated)	75	2739
78. Shale, **Lillydale**, ("Pencil Cave"), black and green, fissile (estimated)	100	2839
Greenbrier Series (30'+)		
79. Limestone, **Alderson**, hard, yellowish-blue, with marine fossils, bryozoa (**Archimedes**) etc., visible above Greenbrier River at mouth of Possum Hollow	30	2869

The following section and the combined well record, compiled by D. B. Reger[7], was published in the report cited in the foot-note:

Green Sulphur Springs Section.

Summers County, Green Sulphur District; starting at the top of Big Swell Mountain 1 mile southeast of Mountain View School and thence extending northwestward to this school and thence northeastward to the mouth of Mill Creek 0.4 mile south of Green Sulphur Springs; gentle northwest dip; measured with aneroid and arranged in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Pottsville Series—Pocahontas Group (120'+)		
Sandstones and shales from top of Big Swell Mountain, not examined but stratigraphic thickness estimated after making deduction for southeastward rise	100	100
Sandstone, buff, massive, pebbly, makes top of ridge near Mountain View School (2860' B.)	20	120
Mauch Chunk Series—Bluestone Group (435')		
Shale, red and variegated	50	170
Sandstone, buff, coarse, micaceous, cliff rock (2795' B.)	15	185
Shale, red	75	260
Sandstone, green	30	290
Shale, red	65	355
Sandstone, green, flaggy, much weathered, makes sharp ridge (2585' B.)	40	395
Shale, sandy (2550' B.), with marine fossils, pelecypods	35	430
Shale, sandy	55	485
Shale, dark	35	520
Fire clay shale, streak, (2460' B.)	......	520
Shale, green	35	555

[7]David B. Reger, Mercer, Monroe, and Summers Counties, W. Va. Geol. Sur., pp. 239-241; 1926.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Princeton Conglomerate (20′)		
Sandstone, **Princeton**, green, massive, with gray streaks, somewhat soft and weathered (2405′ B.)....	20	575
Mauch Chunk Series—Hinton and Bluefield Groups (1765′)		
Shale, red and variegated	25	600
Sandstone, green, massive, with streaks of shale	15	615
Shale, dark-green, (2342′ B.); contains numerous marine fossils, pelecypods	23	638
Limestone, yellowish-green, shaly	2	640
Shale, green	15	655
Concealed, and red shale	30	685
Shale, green, with sandstone	20	705
Sandstone, green, somewhat massive	5	710
Shale, yellowish-green	15	725
Sandstone, greenish-brown, somewhat massive (2245′ B.)	10	735
Shale, red	60	795
Fire clay shale, streak	......	795
Sandstone, shaly (2170′ B.)	15	810
Shale, red	25	835
Sandstone, reddish-brown	5	840
Shale, yellow, sandy	10	850
Shale, red	15	865
Shale, green, sandy	15	880
Sandstone, **Avis**, shaly	5	885
Shale, red	10	895
Shale, **Upper Avis**, yellow, calcareous (2060′ B.); contains marine fossils, pelecypods	25	920
Limestone, **Avis**, gray, shaly (2025′ B.); contains marine fossils, brachiopods, pelecypods, crinoids, and bryozoa	35	955
Shale, **Lower Avis**, yellow, limy; contains marine fossils, pelecypods, and brachiopods (including **Orthotetes**)	10	965
Shale, red	45	1010
Sandstone, reddish at top, green and shaly at base (1920′ B.)	50	1060
Shale, red	95	1155
Shale, yellow	15	1170
Shale, red	15	1185
Sandstone, reddish-brown, hard, flaggy, with streaks of red shale (1780′ B.)	15	1200
Shale, red	10	1210
Shale, yellowish-green	10	1220
Shale, red	25	1245
Sandstone, reddish-brown, shaly (1720′ B.)	15	1260
Shale, red	14	1274
Limestone, yellow, very shaly (1705′ B.)	1	1275
Shale, red	15	1290
Sandstone, very shaly, mixed with red shale	20	1310
Shale, red, with a little sandstone	15	1325
Shale, green, sandy (1650′ B.); contains marine fossils, small pelecypods	5	1330
Shale, red	35	1365

	Thickness. Feet.	Total. Feet.
Sandstone, shaly (1605′ B.)	10	1375
Shale, red	53	1428
Shale, green, to well mouth (1545′ L.)	7	1435
Section continued by record of James H. Gwinn No. 1 Well (No. 7 on Map II):		
Gravel	20	1455
Red rock	215	1670
Slate, white	15	1685
Lime, white	10	1695
Slate, white	20	1715
Red rock	20	1735
Slate	30	1765
Red rock	20	1785
Slate, white	15	1800
Red rock	25	1825
Lime, black	20	1845
Red rock	30	1875
Slate, white	20	1895
Red rock	40	1935
Lime, black	10	1945
Red rock	45	1990
Slate, black	15	2005
Sand, **Maxton (Droop Sandstone?)**	50	2055
Slate, white	100	2155
Lime, **Reynolds,** black	15	2170
Slate, white	3	2173
Lime, black	17	2190
Slate, white	10	2200
Little Lime **(Glenray Limestone),** black	65	2265
Pencil Cave **(Lillydale Shale)**	75	2340
Greenbrier Series (695′)		
Big Lime **(Greenbrier)**	695	3035
Maccrady Series (25′)		
Slate, white	25	3060
Pocono Series (600′)		
Sand, **(Big Injun, Logan, Burgoon)**	75	3135
Slate and shells	325	3460
Sand, **(Weir),** gray	15	3475
Shells, hard lime (gas show at 2100′)	60	3535
Slate	15	3550
Shells, hard lime	85	3635
Sand, **(Berea),** white	25	3660
Chemung Series (775′+)		
Shells, flinty	65	3725
Slate, black	50	3775
Lime and shells, flint (gas shows at 2365′ and 2760′)	480	4255
Shale, black (gas show at 2825′)	5	4260
Lime and flint	175	4435

"A strong stream of salt sulphur water now flows from the 14-inch casing which protrudes from the mouth of this well, there being numerous bubbles of a non-inflammable gas which is apparently hydrogen sulphide."

MEASURED SECTIONS, IRISH CORNER DISTRICT.

Irish Corner is a small district in the south central part of the county. It occupies the area bounded by the Greenbrier River, Monroe County and a line drawn from the south end of Kates Mountain to the town of Caldwell. The surface rocks include the basal part of the Mauch Chunk Series, the Greenbrier, Maccrady, and Pocono Series, and on the headwaters of Harts Run the Upper Devonian is exposed.

In the following section the sample numbers refer to chemical samples, the results of which are published in Chapter XII:

Acme Limestone Quarry Section.

Irish Corner District; measured at the Acme Limestone Quarry, near Fort Spring; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Greenbrier Series—Alderson Member (49′+)		
1. Shale, brown, weathers yellow, sandy, calcareous ⎫	30	30
2. Limestone, blue, hard ⎬ (Sample 184)	8	38
3. Limestone, yellow, very fossiliferous ⎭	4	42
4. Limestone, sandy	2.5	44.5
5. Limestone, impure, hard, abundant, Pentremites and Archimedes	5	49.5
Greenville Shale Member (8′)		
Shale, yellow, calcareous, algal structure	8	57.5
Union Member (178′)		
7. Limestone, dark-gray, crystalline (Sample 183)	16	73.5
8. Limestone, white, oolitic, stylolitic vertically and horizontally (Sample 182)	20	93.5
9. Limestone, bluish-gray, crystalline, oolitic in part, very fossiliferous (Sample 181)	47	140.5
10. Limestone, light-gray, argillaceous (Sample 180)	5	145.5
11. Limestone, bluish-gray, oolitic, fossiliferous (Sample 179)	18	163.5
12. Limestone, grayish-blue, weathers yellow, tough, one band of nodular chert, large crinoid stems (Sample 178)	10	173.5
13. Limestone, gray, oolitic, Pentremites, stylolitic vertically and horizontally 26′ ⎫ (Sample 177)	30	203.5
14. Limestone, dark-gray, crystalline... 4 ⎭		
15. Limestone, gray, fossiliferous (Sample 176)	16	219.5
16. Limestone, grayish-blue, very fossiliferous, a few chert nodules (Sample 175)	16	235.5
Pickaway Member (61′+)		
17. Shale, blue, weathers yellow, calcareous, 0′ to	2.5	238
18. Limestone, dark-gray, fine-grained, stylolitic, thin clay bands (Sample 174)	10	248

		Thickness. Feet.	Total. Feet.
19.	Limestone, thinly laminated, weathers yellow....	5	253
20.	Limestone, siliceous (Sample 173)........................	9	262
21.	Limestone, bluish-gray, weathers yellow, jointed (Sample 172)........................	15	277
22.	Limesone, siliceous, conchoidal weathering (Sample 171)........................	20	297

Horseshoe Bend School Section.

Irish Corner District; starting near the top of a hill ¼ mile east of Horseshoe Bend School, 1.5 miles southeast of Ronceverte and measured down the highway westward to a point just west of Horseshoe Bend School; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Greenbrier Series (70′+)		
Limestone, Hillsdale, gray, cherty, fossiliferous..........	20+	20
Limestone, yellow, earthy, shaly........................	10	30
Shale, olive, yellow, crumbly........................	4	34
Clay, earthy, yellow, ocherous, cut with calcite veins	1	35
Shale, purplish-red, with streaks of yellow and olive, sandy shale........................	15	50
Limestone, ocher, brown, shaly, weathers ribbon-like and yellow........................	10	60
Shale, yellow, sandy, laminated........................	10	70
Maccrady Series (180′)		
Shale, red........................	100	170
Shale, variegated, brown, yellow, purplish........................	10	180
Shale, red........................	50	230
Sandstone, yellowish-brown........................	5	235
Shale, yellow, brown........................	15	250
Pocono Series (5′+)		
Sandstone	5+	255

Patton Section.

Monroe County; Second Creek District; starting just south of Patton and measured along road to Second Creek; arrangement in descending stratigraphic order.

		Thickness. Feet.	Total. Feet.
Greenbrier Series (285′+)			
Limestone, dark-blue, massive, tough, clay veins, chert sparse, few fossils (top, 2135′ B.)........................20′	Patton	130	130
Limestone, dark-blue, abundant chert, some chert nodules blend into limestone, calcite veins cutting chert nodules........................50			
Limestone, gray-blue, semi-oolitic may be small fossils........................15			
Concealed 40			
Limestone, blue-black, conchoidal fracture 5			

		Thickness. Feet.	Total. Feet.
Shale, **Patton**, weathered horizon of very irregular sandy chert with red clay (erosion surface?, 5-10′)..		10	140
Limestone, light-blue, abundant light-gray chert, some nodules quite large, numerous battered bryozoa and crinoid stems..............30′			
Shale, olive-green and sandy (1925′ B.) 10	**Sinks Grove**	60	200
Limestone, blue-black, massive, good 5			
Limestone, weathers sandy................. 5			
Limestone, light-blue, weathers white, clay seams.. 5			
Limestone, light-yellow, argillaceous 5			
Limestone, light-gray, massive, black chert (top, 1900′ B.)......................... 5′			
Limestone, gray-blue, massive, one band of black nodular chert............12			
Shale, yellow, sandy, limy.................. 3			
Limestone, light-blue, yellowish, sandy, shaly, with chert at base....15	**Hillsdale**	85	285
Limestone, much weathered, partly concealed, with chert remaining in place, to Second Creek......................50			

MEASURED SECTIONS, FORT SPRINGS DISTRICT.

Fort Springs is a small triangular-shaped district lying just north of Irish Corner District. The outcropping rocks range from the Bluefield Group of the Mauch Chunk to and including the upper part of the Pocono Series.

Hawver School Section—West.

Fort Springs Blue Sulphur District; starting ½ mile west of Hawver School on Muddy Creek Mountain; measured with aneroid eastward to the road forks at 2440′ L., then with the road down the west side of the mountain to the top of the Alderson Limestone. Measurements shown for that portion above 2440′ are greater than true vertical and for that portion below 2440′ the measurements are less than true vertical. Arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (415′+).		
Sandstone, white, massive, **Droop** (in part) (top, 2640′)	25	25
Shale, yellow, olive, sandy...	90	115
Limestone, impure, shaly, fossiliferous, **Reynolds** (Coll. 114) (top, 2525′)...	15	130
Shale, olive, sandy..	35	165
Shale, red sandy..	35	200
Limestone, blue, gray, impure, heavy-bedded, **Glenray** (top, 2440′ L.)...	40	240
Shale, yellow, olive, sandy, and concealed....................	175	415
Greenbrier Series.		
Limestone, **Alderson** (top, 2225′)..	......	....

Hawver School Section—East.

Fort Springs District; starting ½ mile west of Hawver School on Muddy Creek Mountain; measured with aneroid eastward to the road forks at 2440′ L., then with the road down the east side of the mountain to the road forks at B. M. 1788′. Measurements for that portion above the Greenbrier Series are greater than true vertical while the measurements from the top of the Greenbrier Series down are less than true vertical. Arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (435′+).		
Sandstone, white, massive **Droop**, in part, (top, 2640′ B.)	25	25
Shale, yellow, olive, sandy	90	115
Limestone, impure, shaly, banded, **Reynolds** (**Coll. 114**), (top, 2525′ B.)	15	130
Shale, olive, sandy	35	165
Shale, red, sandy	35	200
Limestone, **Glenray** (2440′ B.). Offset eastward along road to the same horizon.		
Limestone, **Glenray**, (**Coll. 105**), (top, 2355′ B.). Offset eastward along the road to the same horizon	45	245
Limestone, 5′ exposed, **Glenray**, (**Coll. 104**), (top, 2140′ B.)		
Shale, yellow, olive, sandy, and concealed	190	435
Greenbrier Series (150′+)		
Limestone, shaly 40′; Limestone, massive, large crinoid stems 5; Limestone, yellow, shaly 40 — **Alderson** (**Colls. 19 and 102**) (top, 1940′ B.)	85	520
Limestone, blue, massive, **Alderson**	65	585
Limestone, **Union**, (top, B. M. 1788′)	......	....

MEASURED SECTIONS, LEWISBURG DISTRICT.

This small, more or less rectangular-shaped district, affords very few good exposures for measuring sections. The surface rocks include the basal part of the Mauch Chunk, the Greenbrier, the Maccrady, and the upper part of the Pocono Series.

Richlands Section—Northwest.

Lewisburg District; section ¼ mile northwest of Richlands; starting at the top of a knoll and measured descending southward to stream; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series (55′+)		
Shale, green, yellow and sandy	40	40
Sandstone, **Edray**, brown, cross-bedded	15	55
Greenbrier Series (95′+)		
Limestone, **Alderson**, cross-bedded and siliceous at top, blue, more pure, massive near center, shaly at base	65	120
Shale, **Greenville**, dark to yellow, fissile, fossiliferous	15	135
Limestone, **Union**, blue, massive, fossiliferous (**Coll. 64**)	15+	150+

Richlands—Two Miles North Section.

Lewisburg District; starting on Miller Ridge 2 miles north of Richlands and measured along the road southward; arranged in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (540′+)		
Sandstone, **Droop**, white, massive, caps Miller Ridge —exposed (base, 2755′ B.)	20	20
Shale, red, brown, and concealed	270	290
Limestone, lenticular, shaly 20′ } Shale, brown, some reds 30 } **Glenray** Limestone, fossiliferous 10 }	60	350
Shale, yellow, brown, sandy	150	500
Sandstone, **Edray**, gray, brown, cross-bedded	15	515
Shale, **Lillydale**, dark to green, fissile, concretionary	25	540
Greenbrier Series		
Limestone, **Alderson**, shaly	......	....

MEASURED SECTIONS, FRANKFORD DISTRICT.

Frankford District borders on Lewisburg District, being more or less centered on the town of Frankford. The surface rocks range in age from the lower Mauch Chunk to the Upper Devonian.

Savannah School Section.

Frankford District; beginning at road forks on Carroll Hill and traversing southeast along county road to forks ½ mile northwest of Savannah School; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (85′+)		
Concealed	10	10
Sandstone, **Webster Springs**, brown, partly concealed	10	20
Shale, **Lillydale?**, olive-green, sandy, micaceous, fissile	65	85
Greenbrier Series—Alderson Member (111′)		
Limestone, gray, siliceous, Pentremites, **Archimedes**, (top, 2300′ B.)	10	95
Shale, dark, carbonaceous	5	100
Limestone, bluish-yellow, shaly, **Archimedes**	10	110
Shale, yellowish-blue, calcareous, sandy, streak of red shale	15	125
Limestone, bluish-gray, massive, hard, fossiliferous..	10	135
Limestone, bluish-green, weathers yellow, fenestelloids, **Archimedes**, Pentremites, **Composita**, **Spirifers**	10	145
Shale, greenish-blue, weathers yellow, calcareous, fenestelloids, crinoid stems, **Composita**, **Spirifer** (base, 2240′ B.)	25	170
Shale, green, yellow, sandy	15	185
Shale, black	2	187
Limestone, massive, **Archimedes**, **Pentremites**	6	193
Limestone, yellowish-gray, chalky, plants (**Coll. 109**)	3	196
Greenbrier Series—Union Member (40′+)		
Limestone, light gray to white oolite	40	236

Spring Creek Section—South.

Frankford District; measured descending the hill south of Spring Creek, to the mouth of Spring Creek; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Greenbrier Series		
Limestone, cherty, Hillsdale (base, 2060′ B.)	......	....
Maccrady Series (125′)		
Shale, olive-brown, sandy	10	10
Shale, red	115	125
Pocono Series (85′+)		
Sandstone, Broad Ford	85	210

Spring Creek Section—North.

Frankford District; measured ascending the hill north of Spring Creek and rearranged in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Greenbrier Series		
Limestone, cherty, Hillsdale (base, 2020′ B.)	......	....
Maccrady Series (105′)		
Shale, red	105	105
Pocono Series (60′+)		
Sandstone, gray to brown 5′		
Shale, olive-green, sandy, fissile 5	Broad	
Sandstone, grayish-brown to green, cross-bedded, blocky 50	Ford 60	165

Unus Section.

Frankford District; measured along the county road ½ mile northwest of Unus P. O.; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Bluefield Group (100′)		
Shale, dark, weathers brown....90′ } Lillydale	100	100
Shale, black 10 } (Top, 2370′ B.)		
Greenbrier Series—Alderson Member (150′)		
Limestone, yellowish-blue, siliceous, impure Archimedes (top, 2270′ B.)	35	135
Shale, yellow, green, red, sandy, calcareous	25	160
Limestone, blue, shaly, weathers yellow, abundant fossils	90	250
Limestone, Union, blue, massive (B. M. 2120′)	......	....

MEASURED SECTIONS, WHITE SULPHUR DISTRICT.

White Sulphur is a large district in the southeast corner of the county. Every major division of the Devonian rocks in Greenbrier County is exposed in the district and these together

with the Pocono and the basal part of the Greenbrier Limestone, make up the list of outcropping rocks. There are very few exposures in the area suitable for measuring sections.

Caldwell Section.

White Sulphur District; beginning just east of the junction of Monroe Run and Howard Creek and traverse east along the C. & O. Railroad tracks; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Greenbrier Series (42′+)		
Limestone, **Hillsdale**, blue, hard, black chert nodules along and across the bedding (**Coll. 20**)	15	15
Limestone, light-blue, laminated, weathers yellow, brachiopods and bryozoa (**Coll, 21**)	15	30
Shale, yellow, fissile, limy	8	38
Limestone, yellow, weathered	4	42
Maccrady Series (250′)		
Red and buff shales and sandstones (estimated)	250	292
Pocono Series (600′)		
Sandstone, buff, shaly	4	296
Shale, yellow to olive, sandy, pyramidal joints	10	306
Coal blossom and black shale	0.5	306.5
Shale, dark	8	314.5
Sandstone, brown, lenticular (0-3.5′)	3.5	318
Shale, gray, sandy	12	330
Shale, dark, carbonaceous (0-2′)	2	332
Shale, nodular, concretionary, (mud-flat conditions)	5	337
Shale, gray	2	339
Broad Ford: Sandstone, gray, massive, micaceous, makes cliff 50′; Shale, grayish-brown, very sandy 25; Sandstone, grayish-brown, conglomeratic, shaly, clay galls, pyrite concretions (**Colls, 3, 23, 28, 29**) 100	175	514
Concealed, incompetent beds, (**Sunbury Shale?**)	100	614
Sandstone, olive-brown, flaggy (**Coll. 31**)	25	639
Sandstone, olive-brown, more massive but somewhat flaggy	35	674
Concealed, with incompetent beds	75	749

Sandstone, greenish-brown, streaked with white quartz pebbles	4′			
Sandstone, grayish-brown, fine-grained, massive	15			
Sandstone, gray, quartz pebbles	2			
Sandstone, gray, fine-grained	6			
Conglomerate, loosely cemented, various sizes of white quartz pebbles	35			
Shale, brown, arenaceous	6	Berea		
Conglomerate	5	Conglomerate	143	892
Shale, gray to buff, with thin sandstone flags	9			
Sandstone, light-gray, many pebbles	4			
Sandstone, gray, weathers brown	11			
Shale, gray, brown, arenaceous	20			
Sandstone, 12″ to 18″ flags, with quartz pebbles at base	15			
Shale, brown, fissile, sandy	10			
Conglomerate, 0′ 8″ to 1′	1			

Chemung Series (2448′)

Shale, brown, fissile (Colls. 4, 30, 24)			20	912
Sandstone, gray, massive	8′			
Sandstone, gray, shaly	12			
Sandstone, dark-gray, massive	15	Hendricks	37	949
Sandstone, conglomeratic, gray, with quartz pebbles	2			
Sandstone, gray, shaly			10	959
Concealed			200	1159
Sandstone, yellowish-brown, flaggy and shaly, (Coll. 25 near base)			68	1227
Sandstone, hard, massive (Coll. 26)			20	1247
Sandstone, grayish-brown, micaceous (Coll, 32)			24	1271
Sandstone, and sandy shale, gray, olive, and brown (Coll. 33)			10	1281
Sandstone, olive, and somewhat shaly (Coll. 34)			10	1291
Sandstone, gray, green, brown, shaly, exfoliated, weathering (Coll. 35 at base)			80	1371
Sandstone, gray, olive and brown, olive, sandy shale (Coll. 36 at base)			100	1471
Concealed (estimated)			400	1871
Shale and sandstone, gray and green flags and brown sandy shale; exposed along Midland Trail at The Pines (Coll. 37)			100	1971
Concealed (computed)			511	2482
Shale, olive and brown, sandy, sandstone flags and green, olive and brown shales			35	2517
Sandstone, grayish-green and brown sandy shale (Coll. 39)			15	2532
Sandstone, gray, tough, flaggy and shaly (Colls. 40, 41)			50	2582
Sandstone, grayish-blue, shaly (Coll. 42 at top and Coll. 43 at middle)			200	2782

Sandstone, yellow, soft, flaggy (Coll. 44, Atrypa hystrix zone)	20	2802
Concealed (computed)	538	3340
Portage Series (602′+)		
Shale and gray 4″ flagstones (Coll. 45)	4	3344
Concealed (computed)	338	3682
Shale, dark, fissile, weathers brown, gray, hard flags (Colls. 46, 47)	10	3692
Concealed	50	3742
Shale, yellow, brown, fissile, (Coll. 48, near middle)	200+	3942

Eckle School Section.

White Sulphur District; measured along the north side of the road, traversing south from Eckle School; arranged in descending stratigraphic order.

		Thickness. Feet.	Total. Feet.
Marcellus Series (in part) (40′)			
Shale, black, crumpled (Coll. 135)		40+	40
Oriskany Series (88′)			
Sandstone, grayish-blue, hard, calcareous. Orbiculoidea roederi, Rhipidomella musculosa, Hipparionyx proximus, Anoplia nucleata, Camarotoechia oriskania, Spirifer cumberlandiae, Spirifer murchisoni, Anoplotheca dichotoma, Platyceras gebhardi (Coll. 125) 8′ Chert, blue, black to gray, tough, minute joints, hackly 65	Huntersville Chert	73	113
Sandstone, Ridgeley, grayish-brown to white, fragments of "wheat grain" conglomerate, Spirifer arenosus, Spirifer murchisoni, Rhipidomella musculosa (Coll. 152)		15	128
Helderberg Series (90′+)			
Limestone, gray to blue, specks of limonite, weathers sandy, hard, cross-bedded, Schuchertella woolworthana, Rensselaria subglobosa var. avus, Rensselaria sp., Spirifer concinnus (Coll. 123) 50′ Limestone, bluish-gray, limonite specks, knobby, Rhipidomella oblata, Dalmanites pleuroptyx (Coll. 124) 20 Limestone, dark-blue, knobby, irregular bedded bands of hard black chert, Favosites conicus, Spirifer concinnus var. progradius, Dalmanites pleuroptyx 20	Becraft (Coll. 151)	90	218

Bobs Ridge Section.

White Sulphur District; measured on the east side of the gap where Howard Creek cuts through Bobs Ridge; arrangement in descending stratigraphic order.

		Thickness. Feet.	Total. Feet.
Oriskany Series (70'+)			
Chert, **Huntersville**		50+	50
Sandstone, white, coarse, iron-stained fossil pits....10'; Concealed....10	**Ridgeley**	20	70
Helderberg Series (130'+)			
Limestone, gray, crystalline, sandy, limonite specks, few fossils....25'; Limestone, gray, crystalline, crinoid stems, massive, sandy....15; Limestone, gray, to black, cherty, **Streptelasma strictum, Schuchertella woolworthana**....50	**Becraft Member**	90	160
Sandstone, **Healing Springs**, white to brown, massive, quartzitic, 8 samples taken for mineralogical study (in 5' sections)	**New Scotland Member**	40	200

MEASURED SECTIONS, ANTHONY CREEK DISTRICT.

This large district, in the northeast part of the county, contains the oldest rocks outcropping in the territory covered by this report. The outcropping rocks range from the Greenbrier Limestone of the Mississippian down to the Red Medina of the Silurian. In spite of the size of the district and the great thickness of rocks exposed, there are very few exposures at which it is worth while measuring a section. In most of the area the rocks have been so folded and mashed that a true thickness can not be obtained.

In the following two sections, sample numbers marked 1M, 2M, etc., indicate that specimens were collected for mineralogical examination:

Alvon Section—West Side.

Anthony Creek District; measured along the north side of Anthony Creek; traversing southeastward and starting at a point 0.7 mile northwest of Alvon; corrected for dip and arranged in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Marcellus Series (500'±)		
Shale, black, contorted	500±	500

Oriskany Series (85′)

			Thickness. Feet.	Total. Feet.
Chert, tough, blue-gray hackly	45′	Huntersville Chert	70	570
Sandstone, fine, green, weathers brown (sample 1M)	5			
Chert, dark-gray	20			
Sandstone, medium-grained, light-brown, porous (sample 2M)	5′	Ridgeley Sandstone ..	15	585
Sandstone, medium-grained, light-brown, porous (sample 3M)	5			
Sandstone, medium-grained, light-brown, porous (sample 4M)	5			

Helderberg Series (300′)

			Thickness. Feet.	Total. Feet.
Limestone and chert, **Becraft**			60	645
Sandstone, hard, fine-grained, white to light-gray, almost a quartzite (sample 5M)	5′	New Scotland Member—Healing Springs Sandstone ..	25	670
Sandstone, hard, fine-grained, white to light-gray, some porous spaces (sample 6M)	5			
Sandstone, quartzite, weathered, limonite stained and porous from leaching (sample 7M)	5			
Sandstone, and concealed (not sampled)	10			
Concealed and shaly limestone (**Coeymans** if present)	35′	Keyser Limestone Member	215	885
Limestone, sandy to shaly	20			
Limestone, gray, platy, calcite streaks	20			
Limestone, blue-gray, massive, calcite streaks	40			
Limestone, blue-gray	20			
Concealed and gray limestone	65			
Sandstone, **Clifton Forge**, fine-grained, hard, porous and limonite stained from weathering, strongly cemented by silica, (sample 8M)	5			
Sandstone, **Clifton Forge**, fine-grained, hard, porous and limonite stained from weathering (sample 9M)	5			
Sandstone, **Clifton Forge**, fine-grained, hard, some parts porous and limonite stained from weathering (sample 10M)	5			

Salina and Niagara Series (400′)

	Thickness. Feet.	Total. Feet.
Limestone, light-gray, thin-bedded, cut by an intricate network of calcite veins	130	1015
Limestone, bluish-gray, thin, platy, cut by calcite veins	90	1105
Limestone, gray to blue, massive, large calcite veins	55	1160
Limestone, gray, platy to massive, crushed	20	1180

Limestone, dull-gray, coarse-grained, massive		80	1260
Concealed		25	1285
Clinton Series (in part; 60′)			
Sandstone, fine-grained, white, quartzitic (sample 11M) ... 5′	Keefer Sandstone ..	60	1345
Sandstone, fine-grained, hard, white to brown (sample 12M) ... 5			
Sandstone, fine-grained, hard, limonite stains, small cavities lined with quartz crystals (sample 13M) ... 5			
Sandstone, fine-grained, hard, white, weathers brown, some parts porous (sample 14M) ... 5			
Sandstone, fine-grained, hard, quartzitic, white to brown (sample 15M) ... 5			
Sandstone, fine-grained, hard, white to brown (sample 16M) ... 5			
Sandstone, fine-grained, white, quartzitic (sample 17M) ... 5			
Sandstone, fine-grained, hard, white, weathers brown, less weathered parts contain a little calcite and pyrite (sample 18M) ... 5			
Sandstone, fine-grained, hard, gray, contains some calcite and pyrite (sample 19M) ... 5			
Sandstone, fine-grained, hard, white to brown (sample 20M) ... 5			
Sandstone, fine-grained, very hard, quartzitic, white (sample 21M) ... 5			
Sandstone, fine-grained, hard ... 5			

Burr Valley Section.

Pocahontas County, Little Levels District; measured along the road traversing southeastward, starting at a point 1.1 miles south-southeast of Burr School and 0.7 mile northeast of Burr; corrected for dip and arranged in descending stratigraphic order.

		Thickness. Feet.	Total. Feet.
Oriskany Series (93′+)			
Chert, yellow, sandy ... 4′	Huntersville Chert ...	73	73
Chert, gray to black ... 8			
Sandstone, green, fine to very fine-grained, weathers brown, sample 1M) ... 1			
Chert and concealed ... 60			

Sandstone, medium-grained, gray to brown, abundant pyrite (sample 2M)	5	Ridgeley Sandstone	20+	93+
Sandstone, "wheat grain" conglomerate, porous from leaching of calcareous material, stained light-brown from limonite (sample 3M)	5			
Sandstone, medium-grained, porous from leaching of calcareous material, stained light-brown by limonite (sample 4M)	5			
Sandstone, medium- to coarse-grained, white to brown, porous from leaching (sample 5M)	5			
Loose fragments, doubtful				

SUMMARY OF MEASURED SECTIONS.

For convenient reference the thickness of the exposed stratified rocks of Greenbrier County, as determined by the measured sections of this Chapter, is compiled in the following table, showing not only the thickness of the various series but also the totals for the different grand divisions, or periods, down to the lowest depths to which there are exposures or borings. A line of dots (................) under a series indicates that it was not exposed or in some cases not examined, where the section was measured. A question mark (?) indicates that the series was present and was examined but could not be differentiated from the one overlying or the one below it. A plus mark (+) indicates that only a portion of the full series or period is included in the section. In some few cases a section shows a thickness of a series either too great or too small, owing to the dip of the strata where it was made, a reduction to true vertical measurement being impracticable in some of the sections. Sections of this type that effect the accuracy of the table have been marked with an asterisk (*), to indicate that the reader should refer to the detailed section. In all localities where the rocks dip steeply, particularly in the Devonian, all sections were reduced to true vertical measurement and so published. An explanation accompanies each section, where published in the text, detailing the conditions under which it was made:

Summary of Measured Sections in

NAME OF SECTION OR NUMBER OF BORING	PENNSYLVANIAN			MISSISSIPPIAN								
	POTTSVILLE			MAUCH CHUNK								
	New River	Pocahontas	Total	Bluestone	Princeton	Hinton	Bluefield	Total	Greenbrier	Maccrady	Pocono	Total
Acme									297+			297+
Alderson		90+	90+	663	35	849	1202	2749	30+			2779+
Alta							293+	293+	610	75±		978+
A[illegible] Run							330+	330+	35+			365+
Alvon												
Big Clear Creek Mountain	157+	284	441+	?	?	?		521+				521+
Blaker Mills							155+	155+	25+			180+
Blue Sulphur Springs							195+	195+				195+
Bobs Ridge												
*Briery Knob (Pocahontas Co.)	431+		431+	297	50	?	?	1365	210+			1575+
Burr Valley (Pocahontas Co.)												
Butler Mountain							505+	505+	65+			570+
Caldwell									42+	250	600	892+
Charmco	?	?	825+	49+				49+				49+
Cherry Low Place				230+	55	?	?	815+				815+
*Cold Knob—Hinkle Well	?	?	315+	395	80	475	935	1885	475	80	205	2645
Duo	277+		277+									
[illegible] School												
*Goddard Mountain	?	?	415+	300	5+			305+				305+
Green Sulphur Springs		120+	120+	435	20	?	?	2220	695	25	600	3540
Hawver School—East							435+	435+	150+			585+
Hawver School—West							415+	415+				415+
Hominy Falls (Nicholas Co.)	1057		1057+	120	140	?	?	1418	393	?	?	2122
Horseshoe Bend School									70+	180	5+	255+
Julia Post Office									551+	3+		554+
Kieffer			*		35	300+		335+				335+
Little Clear Creek	?	?	420+	?	?	?		480+				480+
Little Rocky Run	?	?	670+	?	?	?		650+				650+
Little Sewell Mountain—South End	?	?	369+	?	?	?		608+				608+
Little Sewell Mountain—West Side	?	?	355+	255	5+			260+				260+
No. 5 E.	387+		387+									
No. 6	537+	70	607+									
No. 7	489		489									
*No. 11	557+	271	828+	11+				11+				11+
*No. 13	175+	330	505+	36+				36+				36+
Patton									285+			285+
Quinwood	411+		411+									
Renick							260+	260+	405+			665+
Renick Valley							400+	400+	225+			625+
Richlands—Northeast							55+	55+	95+			150+
Richlands—Two Miles North							540+	540+				540+
*Roach Run				90	25	520	280+	915+				915+
[illegible]	?	?	733+									
Savannah School							85+	85+	151+			236+
Sewell Mountain—North End	?	?	427+									
*Sims Station	?	?	370+	330	20+			350+				350+
Spring Creek—North										105	60+	165+
Spring Creek—South										125	85+	210+
[illegible] Mountain	?	?	311+									
[illegible]							100+	100+	150+			250+

*See detailed section for dip correction.

Greenbrier County and Adjacent Areas.

NAME OF SECTION OR NUMBER OF BORING	DEVONIAN								SILURIAN							
	Catskill	Chemung	Portage	Genesee	Marcellus	Oriskany	Helderberg	Total	Bossardville	Rondout	Niagara	Clinton	White Medina	Red Medina	Total	Total Section
Acme																297
Alderson																2869
Alta																978
Alum Run																365
Alvon					500±	85	300	885+	?	?	?	60+			460+	1345
Big Clear Creek Mountain																962
Blaker Mills																180
Blue Sulphur Springs															19	195
Bobs Ridge						70+	130+	200+								200
*Briery Knob (Pocahontas Co.)																2006
Burr Valley (Pocahontas Co.)						93+		93+								93
Butler Mountain																570
Caldwell		2448	602+					3050+								3942
Charmco																874
Cherry Low Place																815
*Cold Knob—Hinkle Well	50	400+						450+								3410
Duo																277
Eckle School					40+	88	90+	218+								218
*Goddard Mountain																720
Green Sulphur Springs		?						775+								4435
Hawver School—East																585
Hawver School—West																415
Hominy Falls (Nicholas Co.)	?	?						1111+								4290
Horseshoe Bend School																255
Julia Post-Office																554
Kieffer																335
Little Clear Creek																900
Little Rocky Run																1320
Little Sewell Mt.—South End																977
Little Sewell Mt.—West Side																615
No. 5 E																387
No. 6																607
No. 7																489
*No. 11																839
*No. 13																541
Patton																285
Quinwood																411
Renick																665
Renick Valley																625
Richlands—Northwest																150
Richlands—Two Miles North																540
*Roach Run																915
Russellville																733
Savannah School																236
Sims Mountain—North End																427
*Sims Station																720
Spring Creek—North																165
Spring Creek—South																210
Turniphole Mountain																311
Unus																250

CHAPTER VI

STRATIGRAPHY—PENNSYLVANIAN ROCKS.

INTRODUCTION.

The Pennsylvanian System of rocks forms the uppermost grand division of stratified beds in Greenbrier County, being succeeded only by certain terrace gravels and river clays, that may be of Pleistocene age. The Pennsylvanian probably once covered all of the county but any estimate of its original thickness would be conjectural, although it is likely that most of its subdivisions, as known in counties to the north and west, may have been formed in this area and later removed by erosion.

The subdivisions now remaining, and as classified in descending stratigraphic order, are as follows:

	Feet.
Kanawha Group	250±
New River Group	600 to 950
Pocahontas Group	0 to 340
Apparent maximum	1,540

The various groups are composed of sandstone, sandy or fire clay shales, carbonaceous shales, and coals.

The outcrop of rocks of the Pottsville Series is confined to the northwestern fourth of the county. Figure 8 shows the outcrop of the Pottsville rocks, and Map II shows the same data in much greater detail and on a larger scale.

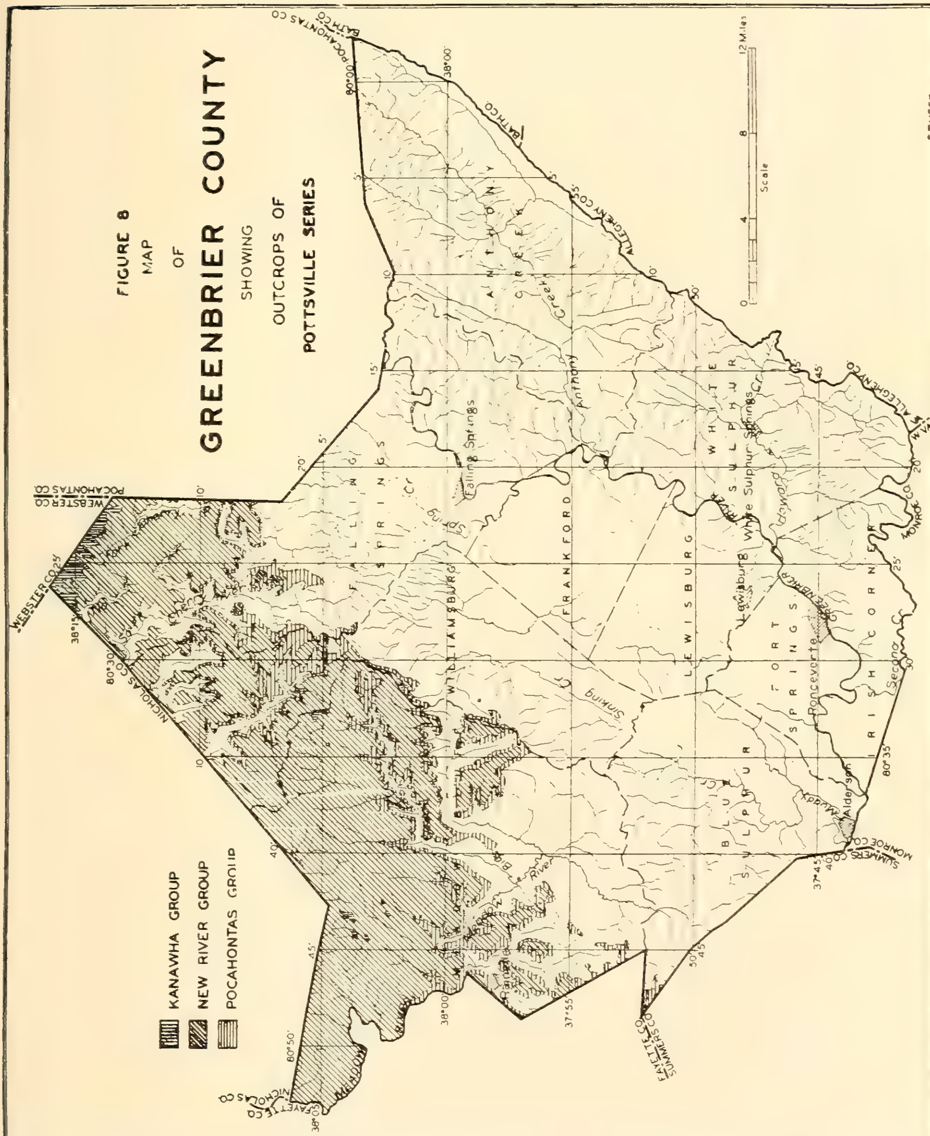
FIGURE 8
MAP
OF
GREENBRIER COUNTY
SHOWING
OUTCROPS OF
POTTSVILLE SERIES
KANAWHA GROUP
NEW RIVER GROUP
POCAHONTAS GROUP
Scale
12 Miles
WILLIAMSBURG
FALLING SPRINGS
FRANKFORD
ANTHONY CREEK
LEWISBURG
WHITE SULPHUR
FORT SPRINGS
IRISH CORNER
BLUE SULPHUR
Lewisburg
White Sulphur Springs
Falling Springs
Ronceverte
Alderson
POCAHONTAS CO
WEBSTER CO
NICHOLAS CO
FAYETTE CO
SUMMERS CO
MONROE CO
ALLEGHENY CO
BATH CO

GENERAL ACCOUNT AND SECTION, POTTSVILLE SERIES.

The Pottsville Series of the Pennsylvanian, representing the base of this System and lying just over the Mauch Chunk Series of Mississippian age, comprises the youngest formation of the region. The Pottsville Series was first named and described by Pennsylvania geologists from its occurrence at Pottsville, eastern Pennsylvania, where it is composed of numerous conglomeratic sandstones accompanied by anthracite coal seams. Later it was subdivided by Dr. I. C. White into the Upper Pottsville or Kanawha Group, the Middle Pottsville or New River Group, and the Lower Pottsville or Pocahontas Group. Custom has sanctioned the use of the geographic names last mentioned because of their relation to the Kanawha and New River coal fields of southern West Virginia and Virginia. The Pottsville Series is represented in western Greenbrier County by the basal members of the Kanawha Group, the New River Group, and the Pocahontas Group.

At the base of the Pottsville Series there is an unconformity, general and as extensive as the series itself. North and west of southern West Virginia, in addition to the thinning of the beds between the coal seams, a greater and greater number of the basal members of the Pottsville Series are absent. In the north and northwest part of the territory of this report the Pocahontas Group is entirely absent, and it is doubtful if all the basal members of the New River Group are present[1].

The following quotation from Price[2] summarizes the history of the deposition of the Pottsville rocks:

"At the close of the Mauch Chunk time there existed a broad low coastal plain, bordering a vast expanse of shoals, ferruginous mud-flats, with ripple marks, mud-cracks, rain-prints, and in some localities fossil tracks. This was followed by an orogenic movement producing subsidence under loading, with stability at intervals, sufficient for a growth of vegetation to form coals. The early subsidence was most pronounced along the east shore with a westward transgression of the sea."

[1]It may be stated here that the report of E. V. d'Invilliers for the Gauley Coal Land Company made in 1900 was very complete for the Gauley or Sewell Coal seam over much of Greenbrier and Nicholas Counties, but as stated by him, the account of other seams was "wholly conjectural." No part of this report is directly traceable to Mr. d'Invilliers' report, but no doubt much of the material taken from the files of the Gauley Coal Land Company originated with him.

[2]Price, Paul H., Pocahontas Report, W. Va. Geol. Survey, p. 66, 1929.

As shown by the borings in Nicholas County there is strong evidence of an ancient drowned valley of Mauch Chunk time, or, interpreted another way, it is evidence of an ancient monadnock on the Mauch Chunk peneplain. It is the only example in southeastern West Virginia to come to the writers' attention, of major topographic relief of that period.

An excellent discussion of the nomenclature of the Pottsville Series is given by Reger[3]. The member names used in southern West Virginia are used in this report as shown in the following general section.

General Section, Pottsville Series, Greenbrier County.

	Thickness. Feet.	Total. Feet.
Kanawha Group (250')		
Fire clay, impure, and shale (not observed in Greenbrier)	5 to 10	10
Sandstone, **Upper Gilbert** (not observed in Greenbrier)	0 to 10	10
Coal, Glenalum Tunnel (not observed in Greenbrier)	0	10
Sandstone, **Lower Gilbert,** massive, gray	30 to 80	90
Coal, Gilbert "A" (not observed in Greenbrier)	0	90
Shale, **Gilbert,** dark, laminated	0 to 4	96
Coal, Gilbert, soft, columnar (not observed in Greenbrier)	2 to 4	100
Shale, sandy	0 to 19	119
Sandstone, **Dotson,** massive, gray	20 to 65	184
Coal, Douglas "A", (not observed in Greenbrier)	0 to 1	185
Shale, sandy, dark	5 to 13	198
Coal, Douglas, often slaty (not observed in Greenbrier)	0 to 2	200
Sandstone, **Lower Dotson,** massive, gray	10 to 25	225
Shale, **Douglas,** dark, sandy, laminated	5 to 13	238
Coal, Lower Douglas, soft, often slaty (not observed in Greenbrier)	0 to 2	240
Shale, gray and sandy	0 to 10	250
New River Group (940')		
Sandstone, **Upper Nuttall,** massive to heavy and current-bedded, grayish-white to brown	70 to 50	300
Shale, dark, sandy	0 to 20	320
Coal, Iaeger "B", multiple-bedded, soft	1 to 0	320

[3]Reger, D. B., Webster Report, W. Va. Geol. Sur., pp. 141 and 559-561, 1920.

	Thickness. Feet.	Total. Feet.
Sandstone, **Lower Nuttall**, massive, medium-grained, gray to brown	50 to 100	420
Coal, Iaeger "A", slaty	1 to 0	420
Shale, **Upper Iaeger**, dark	50 to 40	460
Coal, Hughes Ferry, single-bedded	1 to 2	462
Shale, sandy	0 to 5	467
Sandstone, **Middle Iaeger**, grayish-white, medium-grained	10 to 45	512
Shale, sandy	40 to 10	522
Coal, Lower Iaeger, double-bedded	0 to 2	524
Fire clay shale	0 to 1	525
Sandstone, **Lower Iaeger**, gray and brown	5 to 15	540
Shale, **Lower Iaeger**, dark-gray	15 to 35	575
Sandstone, **Harvey Conglomerate**, medium-grained to coarse, grayish-white to brown, lenticular	60 to 20	595
Shale, **Sandy Huff**, dark-gray	0 to 25	620
Coal, Castle, single-bedded, soft, columnar	2 to 0	620
Sandstone, **Guyandot**, massive, grayish-white, coarse-grained	30 to 50	670
Shale, **Skelt**, sandy, and dark	0 to 5	675
Coal, Sewell "B", slaty, impure	0 to 3	678
Shale, sandy	20 to 30	708
Coal, Sewell "A", double-bedded, soft, columnar	0 to 2	710
Sandstone, **Lower Guyandot**, massive, coarse-grained, grayish-white	10 to 30	740
Shale, **Hartridge**, dark, with plant fossils carrying fresh- or brackish-water fossil shells	0 to 5	745
Coal, Sewell, generally double-bedded, soft, columnar	2 to 7	752
Shale, gray, sandy, lenticular	40 to 5	757
Sandstone, **Welch**, massive to current-bedded, grayish-white	20 to 45	802
Shale, dark, argillaceous, lenticular	0 to 3	805
Coal, Welch, multiple-bedded, soft, columnar	0 to 2	807
Shale, gray, sandy	0 to 5	812
Sandstone, **Upper Raleigh**, heavy to current-bedded, grayish-white to brown	75 to 50	862
Coal, Little Raleigh "A", impure	0 to 1	863
Shale, sandy, lenticular	0 to 25	888
Coal, Little Raleigh, multiple-bedded, soft, columnar	4 to 2	890
Shale, sandy, lenticular	15 to 5	895
Sandstone, **Lower Raleigh**, massive to current-bedded, lenticular	50 to 100	995
Coal, Beckley "Rider"	0 to 2	997
Shale, dark-gray, argillaceous, lenticular	0 to 20	1017
Coal, Beckley, multiple-bedded, soft, columnar	0 to 3	1020
Sandstone, **Quinnimont**, lenticular	0 to 70	1090
Shale, **Quinnimont**, dark-gray, siliceous to argillaceous, laminated, lenticular	10 to 5	1095
Coal, Fire Creek, "Quinnimont", multiple-bedded, soft, columnar	0 to 7	1102
Shale, sandy, with sandstone layers	10 to 28	1130

	Thickness. Feet.	Total. Feet.
Coal, Little Fire Creek, multiple-bedded, soft, columnar	0 to 2	1132
Sandstone, **Pineville,** massive to current-bedded	30 to 50	1182
Shale, sandy	20 to 0	1182
Coal, No. 9 Pocahontas, multiple-bedded, soft, columnar	2 to 0	1182
Shale and sandstone mixed	15 to 4	1186
Coal, No. 8 Pocahontas, impure, soft, columnar	0 to 4	1190
Pocahontas Group (306′)		
Sandstone, **Flattop Mountain,** massive to current-bedded, medium-grained, micaceous, bluish-gray to brown	10 to 40	1230
Shale, **Rift,** dark-gray, with argillaceous and siliceous layers	10 to 0	1230
Coal, No. 7 Pocahontas, multiple-bedded, soft, columnar	0 to 4	1234
Shale, gray and sandy	0 to 5	1239
Sandstone, **Pierpont,** massive to current-bedded, medium-grained, hard, micaceous, bluish-gray to light-gray	40 to 20	1259
Shale, sandy, alternating with sandstone	0 to 10	1269
Shale, **Royal,** buff, sandy, with fresh- or brackish-water fossil fauna	5 to 0	1269
Coal, No. 6 Pocahontas, multiple-bedded, soft, columnar	0 to 5	1274
Shale, sandy	0 to 5	1279
Sandstone, **Eckman,** massive to current-bedded, medium-grained, buff, to bluish-gray	40 to 20	1299
Coal, No. 5 Pocahontas, soft, columnar	0 to 1	1300
Shale, sandstone, and dark shale, with plant fossils abundant	0 to 20	1320
Coal, No. 4 Pocahontas, multiple-bedded, soft, columnar	0 to 2	1322
Shale, sandy	0 to 5	1327
Sandstone, **Upper Pocahontas,** massive to heavy-bedded, medium-grained to coarse	0 to 30	1357
Coal, No. 3 Pocahontas "Rider"	2 to 0	1357
Shale, dark, with plant fossils abundant, and fresh- or brackish-water fossil fauna	0 to 10	1367
Coal, No. 3 Pocahontas, multiple-bedded, soft, columnar	0 to 5	1372
Shale, gray, and sandy	10 to 0	1372
Sandstone, **Lower Pocahontas,** generally massive, medium-grained	0 to 25	1397
Shale, gray and sandy	10 to 0	1397
Coal, No. 2 Pocahontas, multiple-bedded, soft	0 to 2	1399
Shale, gray	0 to 15	1414
Sandstone, **Vivian,** massive, bluish-gray, medium-grained, lenticular	0 to 30	1444
Coal, No. 1 Pocahontas, generally single-bedded, soft, columnar	0 to 2	1446
Shale and sandstone to top of **Mississippian,** or red shales of **Mauch Chunk**	0 to 50	1496

TOPOGRAPHIC EXPRESSION.

The topography of the Pottsville Series in the area, as in all other parts of the State in which the series outcrops, is, in a large degree, rough, rugged, and mountainous. The thick, massive sandstones and conglomerates, cut across by streams, leave standing huge cliffs which make bold shoulders along their valleys and from which much talus accumulates on the slopes. This is reflected by the coal-test borings in that they always report from 10 to over 40 feet of "surface" or "boulders and clay." In regions not cut across by roads, this talus material masks the bed-rock, and coal prospecting must be done by coring or by digging deep trenches. Invariably the series produces a very poor soil unfit for cultivation, so that the land is seldom cleared.

CONTACTS AND UNCONFORMITIES.

The contact of the New River Group of the Pottsville Series with the overlying Kanawha Group is at the top of the prominent Upper Nuttall Sandstone. This is a good horizon at which to make the division because the sandstone is very massive and persistent, and there is little evidence of widespread disconformity.

The contact of the New River Group with that of the underlying Pocahontas Group is not so well marked in this region. It is at the base of the No. 8 Pocahontas Coal and at the top of the Flattop Mountain Sandstone.

In this area, as in other parts of the State, there is evidence of a marked unconformity at the contact of the Pottsville Series with that of the Mauch Chunk. That a considerable period of time elapsed from the close of the latter period before the deposition of Pottsville sediments was begun, as mentioned under the "General Account" above, is also evidenced by the marked contrast in the conditions accompanying sedimentation, the soft, red shales of the Mauch Chunk being succeeded by the heavy, coarse, gray to grayish-white and current bedded sandstones and coal seams of the Pottsville.

Slight local disconformities, revealed by the temporary absence of coal beds and of sandstone or shale members, occur

at many localities within the area. These, however, are rather small in extent and do not warrant description.

FOSSIL LIFE.

In the Pottsville Series throughout southern West Virginia, fossil plants are abundant and well preserved in the shales associated with the coals, and often in the sandstones. They have been widely studied by many authorities[4].

In contrast to the plant life is the scarcity of marine, brackish- or fresh-water fauna. As pointed out by Lucke[5], erroneous conclusions as to conditions of deposition may be drawn from the lack of fossils.

Fossil shells of the genus Lingula have been reported from roof shales of almost every persistent coal of the New River and Pocahontas Groups. In Greenbrier County Price has noted fish teeth, scales, and coprolites in the roof shales of the Sewell Coal.

CORRELATION, POTTSVILLE SERIES.

As pointed out under the "General Account," the detailed subdivisions of that part of the Pottsville Series remaining in Greenbrier County follow the established nomenclature for southern West Virginia. Synonymous names and a reference to the type locality will be given in the description of each member on subsequent pages.

The problem of the proper correlation of individual beds within the Pottsville Series in Greenbrier County is very difficult. The chief causes of the difficulties and some of the specific areas in which they apply may be summarized as follows: (1) The rapid thinning of the Pottsville measures in a north and northwest direction. (2) Paucity of fossil fauna; as noted above, the Pottsville is devoid of any significant fossil fauna. (3) Similarity of the interval between many of the coals and similarity of the lithologic characteristics of

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[4]See Vol. V(A), Part II, W. Va. Geol. Sur., 1913, for a discussion of many of these plants by David White.

[5]Lucke, J. B., Bottom Conditions in a Tidal Lagoon, Journal of Paleontology, pp. 106-107, January, 1935.

the sandstones and of many of the coals. These three factors apply to all of the Pottsville beds throughout the area of their outcrop in the county. (4) Inaccuracies in the topographic base map. This was particularly confusing on the headwaters of Brown Creek and just west of Charmco. (5) Lenticular beds and variations in the interval between coals. These factors apply more or less to all of the Pottsville rocks in Greenbrier County but they are particularly confusing in correlating the Pocahontas coals near Charmco and in correlating the Beckley and Fire Creek Coals near Anjean.

The coal test borings drilled for the Bellwood Coal Company in Fayette County provide excellent illustrations of the lensing of the coal beds, in the interval between the No. 9 and No. 6 Pocahontas Coals. Special attention is called to the record of Boring No. 151 in which is shown four seams of coal two feet or more in thickness and one other coal an inch thick in an interval of only 71 feet. Attention is also called to the record of Boring No. 148 which was drilled less than 0.2 mile north of No. 151. In the same interval that carried five coals in No. 151, the record of No. 148 shows only two coal beds and only one of those is over two feet in thickness.

Under such conditions correlation of individual seams can not always be made with certainty.

DESCRIPTION OF MEMBERS, KANAWHA GROUP.

The Kanawha Group of White[a], comprising the upper portion of the Pottsville Series, is the youngest group of stratified rocks remaining in Greenbrier County, and is represented by its basal portion, with a maximum thickness of 250 feet. Except for small isolated patches on the tops of some of the mountains, the rocks of this group are confined to the extreme northern part of the county. Exposures of the rocks of this group, other than the sandstone ledges, were seldom seen and the character of the intermediate horizons is therefore quite indefinite.

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[a] White, I. C., Vol. II, W. Va. Geol. Sur., pp. 500-502; 1903.

LOWER GILBERT SANDSTONE.

The **Lower Gilbert Sandstone** of Hennen and Reger[7] was tentatively identified near Hanging Rock, just east of the common corner of Nicholas, Webster, and Greenbrier Counties. At the one point observed, it is a massive, grayish-white, coarse-grained sandstone. It appears to cap several knobs near the locality mentioned.

The **Gilbert "A" Coal** of Hennen[8], named for its occurrence in McDowell County, was not observed in Greenbrier County.

GILBERT SHALE.

The **Gilbert Shale** of Hennen[9], named from its occurrence in Wyoming County, was observed at the same locality as the sandstone described above. It was poorly exposed and could not be examined in detail.

The **Gilbert Coal** of Hennen and Reger[10] was not observed in Greenbrier County but it is no doubt present over a small area in the extreme northern part of the county. It is described as minable in the reports for the adjoining counties but due to lack of information it is not so recognized here.

DOTSON SANDSTONE.

The **Dotson Sandstone** of Campbell[11], named from its occurrence at Wyoming Station (formerly Dotson), Mingo County, was noted in the extreme northern part of the county. At the few points it was observed it was a massive gray sandstone with a thickness ranging between 20 and 65 feet.

The **Douglas "A" Coal** and the **Douglas Coal** of Hennen[12], were not observed in Greenbrier County.

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[7]Hennen, Ray V., and Reger, D. B., Logan and Mingo Report, W. Va. Geol. Sur., p. 219; 1914.

[8]Hennen, Ray V., Wyoming and McDowell Report, W. Va. Geol. Sur., p. 167, 1915.

[9]Ibid., p. 168.

[10]Hennen, Ray V., and Reger, David B., Logan and Mingo Report, W. Va. Geol. Sur., pp. 221-222; 1914.

[11]Campbell, M. R., Tazewell Folio, No. 44, U. S. Geol. Sur., 1898.

[12]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 181-182, 1915.

LOWER DOTSON SANDSTONE.

The **Lower Dotson Sandstone** of Hennen[13], named from its relationship to the Dotson Sandstone, appears to be present on a few of the high knobs in Meadow Bluff District and was noted at several places north of the North Fork of Cherry River. In appearance it is similar to the other Pottsville sandstones in that it is massive, gray, and coarse-grained. The thickness of this sandstone ranges from 10 to 25 feet.

DOUGLAS SHALE.

The **Douglas Shale** of Hennen[14], named from its occurrence near the town of Douglas, McDowell County, where it comes just below the Lower Dotson Sandstone (erroneously termed Lower Nuttall in the Report cited) and described as bearing marine or brackish-water fossils, is present but apparently non-fossiliferous in Greenbrier County. It was noted on several high knobs in Meadow Bluff District but was not examined in detail. The total thickness of shale between the overlying Lower Dotson Sandstone and the top of the Nuttall Sandstone appears to be about 25 feet. This may have included the **Lower Douglas Coal** of Hennen[15] which was not definitely recognized in Greenbrier County.

DESCRIPTION OF MEMBERS, NEW RIVER GROUP.

The New River Group of Fontaine[16], named from its development along New River in Fayette and Raleigh Counties, West Virginia, comprises approximately two-thirds of the Pottsville Series of Greenbrier County. It is defined as including the beds between the top of the Upper Nuttall Sandstone and the base of the No. 8 Pocahontas Coal. In the northern part of the county the Pocahontas Group, that normally

[13] Hennen, Ray V., Fayette Report, W. Va. Geol. Sur., pp. 274-275; 1919.

[14] Hennen, Ray V., Wyoming and McDowell Report, W. Va. Geol. Sur., pp. 183-4; 1915.

[15] Ibid., pp. 184-185.

[16] Fontaine, Wm. M., The "Great Conglomerate" on New River, West Virginia, Amer. Jour. Sci., Third Series, Vol. VII, 1874, pp. 459-465, 573-579. The Conglomerate Series of West Virginia, Amer. Jour. Sci., Vol. IX, 1876, pp. 276-284, 374-384.

underlies the New River Group, is absent by means of an unconformity and the New River Group rests directly on the Mauch Chunk. In thickness the series ranges from about 600 feet in the northern part of the county to about 950 feet at the Fayette-Greenbrier County line. In common with the rest of the Pottsville the greatest thinning is toward the northwest.

Of the four minable coals in the group, the Sewell Coal is by far the most important from both an economic and stratigraphic standpoint. In Greenbrier County this coal bed is the most persistent member of the Pottsville and is invaluable in unraveling the stratigraphy of the western third of the county. A description of the Sewell seam and of the three other minable seams—Little Raleigh, Beckley, and Fire Creek—are given on subsequent pages of this Chapter and in Chapter XI.

UPPER NUTTALL SANDSTONE.

The **Nuttall Sandstone** of Campbell and White[17], later termed the **Upper Nuttall Sandstone** by Hennen[18], named for its occurrence along New River, Fayette County, between Nuttallburg and Gauley Bridge, where it is a conspicuous cliff-forming ledge, is present over a small area in Greenbrier County. It is a medium-grained, gray to brown, massive sandstone varying in thickness from 50 to 70 feet. It is generally found only on the mountain tops, some of the best exposures being on Shellcamp Ridge, Little Beech Knob, and Buck Knob. Its stratigraphic position is shown in the General Section and in the Quinwood Section. The interval from the base of the Sewell Coal to the top of the Upper Nuttall Sandstone ranges from about 450 feet in the northern end of the county to slightly over 500 feet near Duo.

IAEGER "B" COAL.

The **Iaeger "B" Coal** of Hennen[19], belonging in the interval between the Upper and Lower Nuttall Sandstones, appears to

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[17]Campbell, M. R., Raleigh Folio, No. 77, U. S. Geol. Sur., Dec. 1901. White, I. C., Bull. 65, U. S. Geol. Sur., p. 200, 1891; Vol. II, W. Va. Geol. Sur., pp. 616 and 665, 1903; and Vol. II(A), W. Va. Geol. Sur., pp. 253-254, 1908.

[18]Hennen, Ray V., Fayette Report, W. Va. Geol. Sur., p. 295, 1919.

[19]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 186-7; 1915.

be represented in Greenbrier County by a very impure coal or black shale that is usually less than one foot in thickness. Its horizon is noted in the Quinwood Section and in Boring No. 7.

LOWER NUTTALL SANDSTONE.

The **Lower Nuttall Sandstone** of Hennen[20], named for its occurrence along New River, Fayette County, where it occurs a few feet below the Upper Nuttall Sandstone and is a prominent cliff-forming ledge, is often quite shaly in Greenbrier County. As a result its outcrop was seldom noted, being recorded in only the Quinwood Section. At that locality it is a gray to brown, medium-grained sandstone, 30 feet thick. It is recorded in Borings Nos. 5E, 7, 8, and 10 with a thickness of 50 to 95 feet, the lower part of the bed being somewhat shaly.

Since its top belongs immediately below the Iaeger "B" Coal, its interval above the Sewell Coal is 400 to 450 feet.

IAEGER "A" COAL.

The **Iaeger "A" Coal** of Hennen[21], named from its occurrence in McDowell County, where it comes only a few feet under the Lower Nuttall Sandstone, was not observed as a surface exposure, but is noted in Borings Nos. 7, 8, and 10, being only a few inches in thickness. It belongs 330 to 350 feet above the Sewell Coal and 40 to 50 feet above the Hughes Ferry Coal.

UPPER IAEGER SHALE.

The **Upper Iaeger Shale** of Hennen[22], named from its occurrence in McDowell County, where it occupies the interval between the Iaeger "A" Coal and the Hughes Ferry (Iaeger) Coal, is represented in Greenbrier County by a dark to gray, sandy shale 40 to 50 feet thick. Its thickness and stratigraphic position are shown in the Quinwood Section and in records of Borings Nos. 8 and 10.

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[20]Hennen, Ray V., Fayette Report, W. Va. Geol. Sur., p. 297, 1919.
[21]Hennen, Ray V., Wyoming-McDowell Report, p. 188, 1915.
[22]Ibid., pp. 188-9.

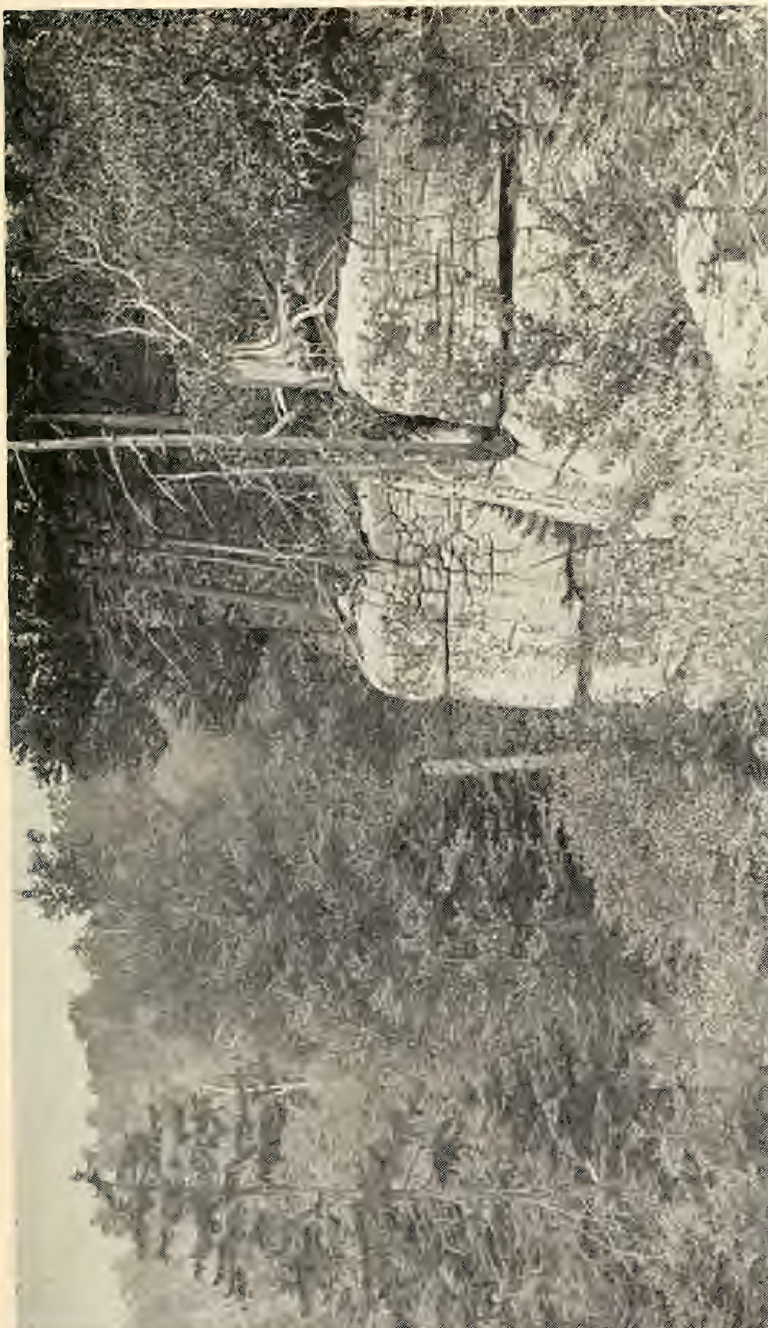

PLATE X.—Pottsville Sandstone (Guyandot) on Little Rocky Run of South Fork of Cherry River.

PLATE XI.—View of operations in the Sewell Coal just east of Quinwood.

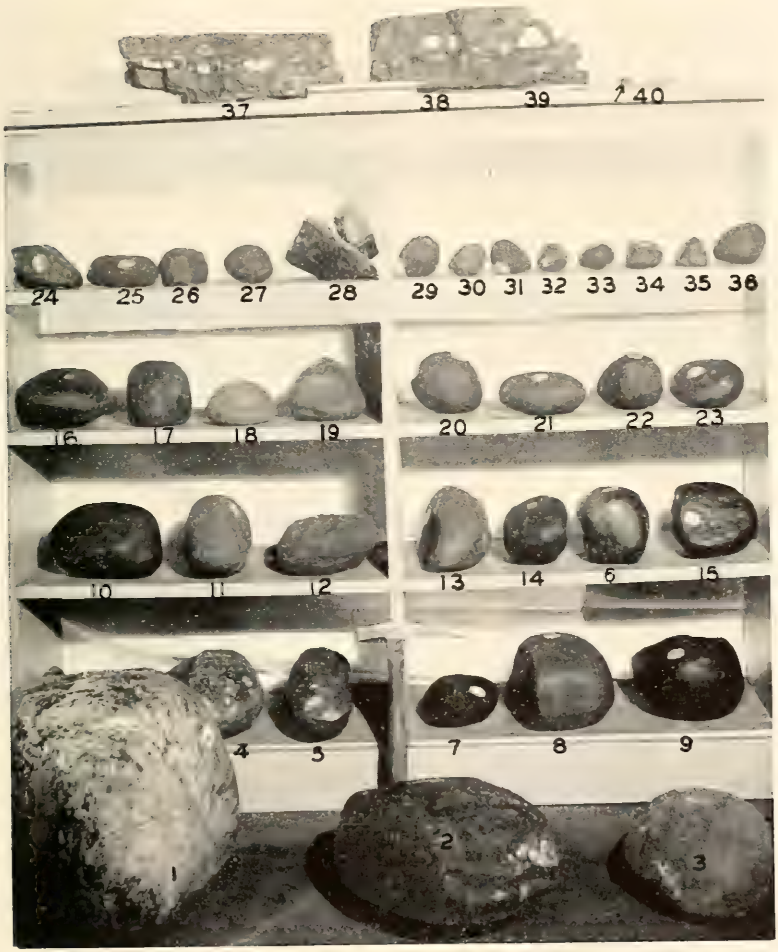

PLATE XII.—Erratic boulders from the Sewell Coal, Greenbrier County. No. 28 is a granite that was broken by the miners. Photo. by Paul H. Price.

PLATE XIII.—Fossil plant showing attached rootlets. Pottsville Sandstone (Upper Raleigh) at Duo.

HUGHES FERRY COAL.

The **Hughes Ferry Coal** of White[23], named from its occurrence on the north side of Gauley River, just above the Hughes Ferry bridge, 2.8 miles south of Summersville, Nicholas County, and believed by Hennen[24] to represent the **Iaeger Coal** of White [25], seldom reaches two feet in thickness in Greenbrier County. It is recorded in the Quinwood Section as two feet thick, but impure, and in the records of Borings Nos. 5E, 7, 8, and 10 as being less than one foot six inches thick. It belongs 275 to 300 feet above the Sewell Coal.

MIDDLE IAEGER SANDSTONE.

The **Middle Iaeger Sandstone** of Hennen[26], named from its occurrence at Iaeger, McDowell County, is a shaly lenticular sandstone in Greenbrier County. In its more massive phase, it is a gray to brown, medium- to coarse-grained sandstone, rarely over 30 feet in thickness. Its character and stratigraphic position are shown in the Quinwood Section and in the record of Borings Nos. 5E, 7, and 10. The bottom half of the usual 60-foot interval between the Hughes Ferry Coal and the Lower Iaeger Coal is occupied by a sandy shale.

LOWER IAEGER COAL.

The **Lower Iaeger Coal** of Hennen[27], named from its occurrence at Iaeger, McDowell County, is represented in Greenbrier County by an impure coal that varies in thickness with the amount of impurities included in the measurement. It is too thin, impure, and irregular to be classified as a minable seam. The following is one of the few observed exposures of this coal:

Coal Blossom—No. 3 on Map II.

On the Russellville-Nutterville road, 1.3 miles east of Russellville; **Lower Iaeger Coal**; elevation, 2365′ B.

	Ft.	In.
Coal, poorly exposed	0	6

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[23]White, I. C., Vol. II(A), W. Va. Geol. Sur., pp. 252-253, 1904.
[24]Hennen, Ray V., Fayette Report, W. Va. Geol. Sur., p. 299, 1919.
[25]White, I. C., Vol. II(A), W. Va. Geol. Sur., pp. 251-252, 1908.
[26]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., p. 190, 1915.
[27]Ibid., p. 190.

The character and stratigraphic position of the Lower Iaeger Coal are shown in the Quinwood Section and in the records of Borings Nos. 5E and 8. Its interval above the Sewell Coal varies from 215 to 245 feet.

LOWER IAEGER SANDSTONE.

The **Lower Iaeger Sandstone** of Hennen[28], named for its occurrence near Iaeger, McDowell County, appears to be poorly represented in Greenbrier County. When present it is a grayish-brown shaly sandstone rarely more than 15 feet thick. Its character and stratigraphic position are shown in the Quinwood Section and in the record of Boring No. 7.

LOWER IAEGER SHALE.

The **Lower Iaeger Shale** of Hennen[29], named from its occurrence near Iaeger, McDowell County, is represented by a dark-brown to gray sandy shale in Greenbrier County. It ranges from 15 to 35 feet in thickness and its stratigraphic position is shown in the records of Borings Nos. 5E, 9, and 10.

HARVEY (CONGLOMERATE) SANDSTONE.

The **Harvey (Conglomerate) Sandstone** of Campbell[30], named from the town of Harvey (now Bolt P. O.), Raleigh County, is represented in Greenbrier County by a medium- to coarse-grained, grayish-white or light-brown sandstone. It is a lenticular bed, its interval being often occupied in part or occasionally entirely by sandy shale. The sandstone proper ranges from 20 to 60 feet in thickness, being fine- to medium-grained, gray or grayish-brown and hard. Its stratigraphic position is noted in the Quinwood Section and in the records of Borings Nos. 5L, 5E, 8, 9, and 10. In its more massive phase this sandstone is occasionally apparently coalesced with the Guyandot Sandstone, cutting out the intervening Sandy Huff Shale and the Castle Coal.

SANDY HUFF SHALE.

The **Sandy Huff Shale** of Hennen[31], named for its exposure at the mouth of Sandy Huff Branch, McDowell County, is rep-

[28] Ibid., p. 191.

[29] Ibid., p. 191-2.

[30] Campbell, M. R., Raleigh Folio, No. 77, U. S. Geol. Sur., 1902.

[31] Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., p. 193, 1915.

resented at various points throughout the territory of this report. When present, the shale compensates for the varying thickness of the Harvey Sandstone, is dark-gray in color, somewhat sandy, and is frequently cut out by the Harvey Sandstone. Its character and stratigraphic position are shown in the Quinwood Section and in the records of Borings Nos. 8, 9, and 10.

CASTLE COAL.

The **Castle Coal** of Hennen[32], named from its occurrence near the town of Castle, Wyoming County, was identified at various points in Greenbrier County. In general it appears to be a high quality of coal but is too thin for mining, rarely reaching two feet in thickness. In the Quinwood Section it is about 115 feet above the Sewell Coal, north of Anjean in Borings Nos. 5E, 5L, and 5M, it is 100 to 120 feet above the Sewell Coal, and east of Duo, what appears to be the same coal is shown in the records of Borings Nos. 7, 8, 9, and 10 as 144 to 167 feet above the Sewell Coal. As mentioned above, the Harvey Sandstone occasionally cuts out this coal.

GUYANDOT SANDSTONE.

The **Guyandot Sandstone** of Campbell[33], named for its occurrence in Wyoming County, is also noted in Greenbrier County, being massive, grayish-white and coarse-grained. It is somewhat lenticular, its interval sometimes being occupied by sandy shale. When present, it ranges in thickness from 30 to 50 feet. Its position is noted in the Quinwood Section and in the records of Borings Nos. 5E, 5L, 5M, 7, 8, 9, and 10. As noted above, the Guyandot Sandstone is sometimes apparently coalesced with the Harvey Sandstone.

SKELT SHALE.

The **Skelt Shale,** of Reger[34], named from its occurrence near the village of Skelt, Webster County, was tentatively identified in the Quinwood Section where it is black and 6½ feet thick.

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[32]Ibid., pp. 193-4.
[33]Campbell, M. R., Raleigh Folio, No. 77, U. S. Geol. Sur., 1902.
[34]Reger, David B., Webster Report, W. Va. Geol. Sur., p. 198, 1920.

SEWELL "B" COAL.

The **Sewell "B" Coal** of Hennen[35], named from its occurrence in Wyoming and McDowell Counties, was noted at only one locality in Greenbrier County. In the Quinwood Section it is noted as being six inches thick. Its interval above the Sewell Coal at this point is about 60 feet.

SEWELL "A" COAL.

The **Sewell "A" Coal** of Hennen[36], named from its association with the Sewell Coal in Wyoming and McDowell Counties, was noted at various points in the territory covered by this report. It is usually one to two feet in thickness, although occasionally thicker, and in many respects it resembles the Sewell Coal in appearance.

While it is generally too thin to be classed as a minable seam, this coal will no doubt eventually furnish some fuel for local use. Its stratigraphic position is shown in the Duo and Quinwood Sections and in the records of Borings Nos. 5E, 5J, 5L, 5M, 7, 8, 9, and 10.

The following two prospects appear to represent the Sewell "A" Coal:

Gauley Coal Land Company Prospect No. 97—No. 7 on Map II.

On the west bank of Elijah Branch, 1.3 miles northwest of Duo: authority, Gauley Coal Land Company; **Sewell "A" Coal?**; elevation, 3519′ L.

		Ft.	In.
Coal		2	8

Gauley Coal Land Company Prospect—No. 9 on Map II.

On the north side of Beech Ridge, 1.1 miles northeast of Clearco; authority, Gauley Coal Land Company; **Sewell "A" Coal**; elevation, 3577′ L.

			Ft.	In.
Coal	0′	2″		
Slate	0	1		
Coal	2	3	2	6

[35]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 195-6 and 535-541, 1915.

[36]Ibid., p. 196.

LOWER GUYANDOT SANDSTONE.

The **Lower Guyandot Sandstone** of Hennen[37], named from its occurrence near Wilmore, McDowell County, is a massive, coarse-grained, grayish-white sandstone in northern Greenbrier County but over much of Meadow Bluff District its position in the column is, in whole or in part, occupied by sandy shale. Its character and stratigraphic position are shown in the Duo Section and in the records of Borings Nos. 5I, 6, and 8.

On Fork Mountain, in the vicinity of the abandoned coal mines No. 224 and No. 225, this sandstone has, in places, apparently "cut out" or mashed out the Sewell Coal. In areas where this sandstone is thick it is advisable for coal companies to thoroughly prospect the property before spending any large sums in opening mines.

HARTRIDGE BLACK SHALE.

The **Hartridge Black Shale** of Reger[38], named from its occurrence at the mining village of Hartridge, Randolph County, was observed at a number of localities in Greenbrier County. As a rule it is a dark to black, argillaceous, laminated deposit, with abundant plant fossils. Its stratigraphic position is shown in the Duo Section, in the records of Borings Nos. 6, 7, 8, 9, 10, and 11, and it is noted in connection with a number of the special sections of the Sewell Coal in Chapter XI.

This shale is often rich in flora and fauna. Fossil Collections Nos. 6, 13, 85, 142, 143, 145, 146, and 149 were collected from this horizon and in addition to the plant fossils, and **Naiadites elongata**, previously reported in this number, Price found fish remains. These are listed under Collection No. 146 in Chapter XIV.

SEWELL COAL.

The **Sewell Coal** of White[39], named from its occurrence on Sewell Mountain, Fayette County, is by far the most important member of the Pottsville present in Greenbrier County and has long been mined extensively on a commercial scale. It

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[37]Ibid., pp. 175 and 196-7.

[38]Reger, David B., Barbour-Upshur-Western Randolph Report, W. Va. Geol. Sur., pp. 288-290; 1918.

[39]White, I. C., The Virginias, pp. 7-16; January, 1885; Bull. 65, U. S. Geol. Sur., p. 197; 1891; and Vol. II, W. Va. Geol. Sur., pp. 657-665; 1903.

is usually multiple-bedded, soft, and columnar, with a very low content of sulphur, ash, and phosphorus. Being comparatively low in volatile matter the coal has an enviable reputation as a steam and domestic fuel. Its stratigraphic position is shown in the Duo and Charmco Sections and in the records of Borings Nos. 5E, 5J, 5K, 5L, 5M, 6, 7, 8, 9, 10, and 11. This coal was measured and sampled at numerous mines and prospects. These data together with Figure 17 showing the approximate minable area of Sewell Coal, and an estimate of its available tonnage, are published in Chapter XI. In addition to a vast amount of detailed information concerning the thickness and distribution of the Sewell Coal in Greenbrier County, Chapter XI also contains the records of a number of coal test borings drilled in Nicholas County. Many of these records have not previously been published and their publication in this report makes available to the public much additional information on the coals (particularly the Sewell Coal) of southeastern Nicholas County.

In Greenbrier County, as in the adjoining counties, the Sewell Coal is a very important "key-rock." The green structure contours on Map II are based on it and the outcrop of the seam is outlined in blue on the same map. In Chapter IV, page 137, a table of intervals is published showing its approximate distances in feet above or below other stratigraphic markers.

The Sewell Coal is the same as the "Gauley Seam" of earlier reports, the same as the famous "Davy" bed of McDowell County, and is believed by Reger[40] to be the same as the Sharon Coal of Pennsylvania.

Erratic Boulders in the Sewell Coal.

As pointed out by Price[41] the most outstanding example of erratic boulders in coal, yet reported, occurs in the Sewell Coal of Greenbrier County. The following table, taken from the paper referred to above, gives a description of forty boulders. The key number in the left-hand column of the table refer to Plate XII, taken from the same paper:

[40]Reger, David B., Barbour-Upshur and Western Randolph Report, W. Va. Geol. Sur., pp. 266 and 291, 1918.

[41]Price,, P. H., Erratic Boulders in Sewell Coal of West Virginia, Jour. Geol., Vol. XL, No. 1, pp. 62-73, 1932.

Table I.—Boulders from Sewell Coal in Greenbrier, County, West Virginia.

No.	Mine.	Weight Pounds	Dimensions (Inches) Greatest Length	Width	Height	Kind of Rock	Remarks	Slide No.
1	Margarette	161½	19	15	14	Quartzite, gray	From lower half of coal	1
2	Margarette	58	14	12	8	Sandstone, gray, medium-grained, quartzitic	From lower half of coal	2
3	Margarette	25	11	8	6	Quartzite, gray	Kidney-shaped	3
4	Leslie	22	10½	7½	5½	Quartzite, gray	From roof shales	....
5	Margarette	10½	9½	4	5	Sandstone, dark, carbonaceous	Rectangular with rounded edges	4
6	Margarette	7½	5½	4	4	Quartzite, dark to white	Vein-quartz? very compact	....
7	Margarette	3¼	5	4¾	3	Sandstone, grayish-white	Medium grain size	5
8	Leslie	17¼	7½	6	5½	Quartzite, dark-gray	Rectangular block with rounded edges	....
9	Margarette	17½	11	7	6	Sandstone, gray, fine-grained	Estimated original weight, 21 pounds	6
10	Leslie	12¼	7	7	5½	Quartzite, gray	Polished	....
11	Leslie	10½	10½	3¾	4¾	Quartzite, gray	Broken in transportation	....
12	Margarette	10¾	10½	7	4	Sandstone, conglomerate, gray	Cut in quartz vein	7
13	Leslie	10¼	9	4½	4	Quartzite, grayish-white	Estimated original weight, 12 pounds	....
14	Leckie	12	8½	4	3¾	Quartzite, gray	Well polished	....
15	Margarette	8½	6½	5	4½	Quartzite, gray	Subangular	....
16	Leslie	7¾	6½	6	4	Quartzite, gray	Elliptical, well polished	....
17	Leslie	5	5	4	4	Quartzite, gray to maroon	Subangular, three flat faces	8
18	Leslie	4½	7½	4½	3	Quartzite, gray	Bottom side flat	....
19	Margarette	4½	5	4	4	Quartzite, gray	Subangular (see 15, 17), striations	....
20	Margarette	4	....	....	....	Quartzite, altered	Spherical, cut by quartz vein, sericite, quartz, and chlorite	9
21	Leslie	3½	5½	4½	2½	Conglomerate, metamorphosed	Quartz grains, 5 mm. to very fine. Chlorite, sericite, and secondary quartz, pyrite	10

Table I.—Boulders from Sewell Coal in Greenbrier County, West Virginia, (Continued).

No.	Mine.	Weight Pounds	Dimensions (Inches) Greatest Length	Width	Height	Kind of Rock	Remarks	Slide No.
22	Leslie	3	....	....	....	Vein-quartz	Well rounded	....
23	Leslie	3⅛	5	4¼	3	Quartzite, gray	Well rounded	....
24	Margarette	2⅝	5	3½	2½	Quartzite, cut by quartz vein	Angular	11
25	Margarette	2⅜	4¾	4½	2	Conglomerate, metamorphosed	Cavities. Blue and clear quartz, pyrite, some feldspar, altered, dark inclusions	12
26	Leslie	6	....	....	....	Vein-quartz	Broken, originally well rounded	....
27	Leslie	$2\frac{3}{16}$	5½	3	2½	Quartzite, gray	Kidney-shaped, parallel pyrite veins	....
28	Leslie	25	....	....	....	Granite, altered	Broken, weight estimated	13
29	Margarette	2	....	....	....	Conglomerate, metamorphosed	Subangular, much pyrite	14
30	Leslie	1	4¼	2½	1¾	Vein-quartz	Elongate, rounded pitted surfaces	....
31	Margarette	1	3½	2½	2	Quartzite	Faceted faces	....
32	Leslie	⅝	3¼	2	1½	Quartzite	Smooth, kidney-shaped	....
33	Margarette	⅝	3	2⅔	2½	Quartzite	....	....
34	Leslie	2	....	....	....	Quartzite, bluish-gray	Broken, rectangular cross-sections	....
35	Leslie	5	....	....	....	Quartzite, gray to maroon	Compare with No. 17	....
36	Margarette	1⅝	3½	2	2	Sandstone, grayish-white, quartzitic	Pyrite scattered through	15
37	Leslie	....	....	....	....	Quartzite, impure conglomerate	In coal specimens. See Figure 2	16
38	Leslie	....	....	....	....	Sandstone, gray, fine-grained	Clayey cementing material, now mostly sericite	17
39	Leslie	....	....	....	....	Quartz porphyry (?) highly altered	Fine-grained quartz; kaolinite (?) sericite, chlorite, pyrite	18
40	Leslie	½ oz.	....	....	....	Vein-quartz	Small walnut	....

Subsequent to the writing of the paper cited above, the writers observed literally hundreds of these boulders at the various mines near Quinwood, the Leckie mines near Anjean, the Raine mine near Duo, and at the Clearco mine near Clearco. The air-line distance between the Clearco mine and the Leslie mine is approximately ten miles, thus any theory suggested to account for the occurrence of the boulders must permit widespread distribution.

The following discussion of the transportation of the erratics is a quotation taken from pages 72 and 73 of the paper cited above:

"To account for the presence of boulders in coal, the view previously expressed by most geologists is that they were held in the roots of trees and rafted to their present position. To assume that all of these boulders, especially the larger ones (see Fig. 3, Nos. 1, 2, 3), could have been carried to their present location without considerable quantities of other foreign material, calls for a stretch of the imagination. That some may have been so transported is not doubted. It does not seem logical, however, that a stream sufficiently large to raft trees that could carry some of the boulders here noted would be found in a coal-forming environment. A stream of such size would certainly "wash out" the peat bog itself. Furthermore, the presence of boulders at various horizons in the coal would necessitate the presence of the stream throughout the entire time of the accumulation of the coal-making material.

"The second method of transportation, which is looked upon with favor by some but strenuously objected to by others, is ice. The prevailing opinion seems to be that Pennsylvanian temperatures were not sufficiently low for the formation of ice. Considerable evidence, however, has been advanced to show that during a part of the Pennsylvanian, and specially in the higher altitudes, ice was present for a portion of the year, a view in which the writer concurs. The present boulders, however, do not show the characteristics common to those transported by ice, such as faceted faces or striations. It does not follow, however, that river or shore ice may not have carried these boulders from beaches or along the banks of streams into the Pottsville basin. This, however, would be expected prior to or following the coal accumulation, and could account for the boulders only in the underclay or the overlying sediments. It has already been pointed out that the boulders do not occur at any one particular horizon in the seam, but may be found at any level from the underclay to the roof shales. It should be stated, however, that the majority are found in the lower part of the seam.

"If we may assume immediately preceding the coal accumulation a stream with a very low gradient, along which boulders had been deposited by transporting agents, gradually being encroached upon by coal vegetation, it would be possible for trees by overturning to draw the erratics up into the peat bog. It is known that succeeding vegetation continued to extend its roots into the peat bog. This condition could and would be repeated at succeeding intervals so as to

lift the boulders to any level in the accumulating material. Such an environment could be explained by a slight uplift near the mouth of a river that formerly had a rather steep gradient."

WELCH SANDSTONE.

The **Welch Sandstone** of Hennen[12] named from its occurrence near the town of Welch, McDowell County, is present in the territory of this report and quite often it apparently coalesces with the underlying Upper Raleigh Sandstone, cutting out the Welch Coal. It is usually grayish-white, medium- to coarse-grained, lenticular and ranges in thickness from 20 to 45 feet. Its interval in the column is sometimes occupied by sandy shale. Its stratigraphic position is shown in the Little Rocky Run Section and in the records of Borings Nos. 5M, 6, 9, and 11.

WELCH COAL.

The **Welch Coal** of White[43], named from its occurrence near Welch, McDowell County, was noted at several points in Greenbrier County. In general it is a soft, columnar coal, resembling the Sewell bed in appearance and is rarely over two feet in thickness. North of Quinwood, on Price Fork, and on the headwaters of Hominy Creek in the edge of Nicholas County, this seam may have a thickness of 30 inches or more and it is reported that prospectors have confused its outcrop with that of the overlying Sewell Coal. The coal appears to be of excellent quality and while the seam is too thin and erratic in occurrence to be classified as minable, it will, no doubt, eventually furnish some fuel for local use. As noted in the description of the overlying sandstone, the Welch Coal is often cut out by the Welch Sandstone. The stratigraphic position of the Welch Coal is shown in the Duo Section and in the records of Borings Nos. 5K, 5M, 9, and 11.

UPPER RALEIGH SANDSTONE.

The **Upper Raleigh Sandstone** of White[44], named from its occurrence in Raleigh County and being the upper division

[12] Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 198-9; 1915.

[43] White, I. C., Vol. II, W. Va. Geol. Sur., pp. 666-7; 1903.

[44] White, I. C., Vol. II(A), W. Va. Geol. Sur., p. 198; 1908.

of the **Raleigh Sandstone** of Campbell[45], is believed by Reger[46] to be the same as the **Sharon Sandstone** of Pennsylvania. It is generally massive, grayish-white to brown, medium- to coarse-grained, occasionally pebbly and forms great cliffs around the mountainsides along its outcrop. It has often acted as a buffer in preserving from erosion a large acreage of coal and wide benches with the Upper Raleigh Sandstone outcropping at the edge are common. Its thickness ranges from 50 to 75 feet and its top varies from 20 to 60 feet below the Sewell Coal. Its character and stratigraphic position are shown in the Charmco, Duo, and Little Rocky Run Sections and in the records of Borings Nos. 5A, 5H, 5M, 6, 9, and 11. The sandstone contains a larger amount of coarse material and is more often conglomeratic in the northeastern part of its outcrop in the county than in the southwest part of the county.

LITTLE RALEIGH "A" COAL.

The **Little Raleigh "A" Coal** of Krebs[47], named from its occurrence in Raleigh County, appears to be represented at a few points in the county. It is generally impure, less than one foot in thickness, and comes 10 to 20 feet above the Little Raleigh Coal. Its character and stratigraphic position are shown in the Charmco Section and in the records of Borings Nos. 5C, 9, and 11.

LITTLE RALEIGH COAL.

The **Little Raleigh Coal** of White[48], named from its occurrence in Raleigh County, occurs in the basal part of the 10 to 30 feet of shale that usually separates the Upper and Lower Raleigh Sandstones. It is quite persistent over most of Greenbrier County and in some areas it is definitely of minable thickness. It is generally multiple-bedded, soft, and columnar and ranges in thickness from a few inches to slightly over four feet, usually carrying slate partings when the greater thickness is approached. This coal has been mined at

[45]Campbell, M. R., Raleigh Folio, No. 77, U. S. Geol. Sur.; 1902.
[46]Reger, David B., Barbour, Upshur, and Western Randolph Report, W. Va. Geol. Sur., pp. 292-293; 1918.
[47]Krebs, C. E., Raleigh Report, W. Va. Geol. Sur., pp. 322 and 361; 1916.
[48]White, I. C., Vol. II(A), W. Va. Geol. Sur., pp. 198-9; 1908.

several points for local consumption but at the present (1936) there are no actively operating mines in the county. Greenbrier is the only county in the State in which the Little Raleigh Coal is known to be of minable thickness.

Under "Commercial Coal," Chapter XI, numerous measurements of the thickness of the Little Raleigh Coal are given. In that Chapter will also be found chemical analyses of coal from this seam, an estimate of the probable available tonnage and Figure 19 shows the probable area of minable Little Raleigh Coal. The stratigraphic position of the seam is shown in the Charmco Section and in the records of Borings Nos. 5, 5A, 5C, 5H, 5I, 5K, 5M, 6, and 11. The position of the outcrop of this seam is not shown on Map II but it may easily be plotted by reference to the Sewell Coal contour lines, using the table of intervals published in Chapter IV, page 137.

LOWER RALEIGH SANDSTONE.

The **Lower Raleigh Sandstone** of White[49], or the lower division of the **Raleigh Sandstone** of Campbell[50], in Greenbrier County, often attains a development almost equal to that of the Upper Raleigh ledge, which it resembles in both texture and physical appearance. Its thickness and stratigraphic position are shown in the Russellville Section and in the records of Borings Nos. 5, 5A, 5H, 5K, 5M, 6, 11, and 12.

BECKLEY "RIDER" COAL.

The **Beckley "Rider" Coal** of Krebs[51], named from its association with the Beckley Coal in Raleigh County, was tentatively identified in the general vicinity of Anjean. The occurrence of this coal is very erratic and its correlation is very uncertain. It was not observed at outcrop but its stratigraphic position is shown in the records of Borings Nos. 5C, 5D, 5I, and 5H.

BECKLEY COAL.

The **Beckley Coal** of Campbell[52], named from its occurrence near the city of Beckley, Raleigh County, was opened at numerous points in Greenbrier County. It is generally

[49]Ibid., pp. 198-9.
[50]Campbell, M. R., Raleigh Folio, No. 77, U. S. Geol. Sur., 1902.
[51]Krebs, C. E., Raleigh Report, W. Va. Geol. Sur., p. 362; 1916.
[52]Campbell, M. R., Raleigh Folio, No. 77, U. S. Geol. Sur., 1902.

multiple-bedded, soft, columnar and at some points it bears a striking resemblance to the Sewell bed in appearance. This similarity in appearance has led some prospectors to believe that the uppermost coal prospected on Little Clear Creek Mountain is the Sewell Coal. A comparison of the records of Borings No. 11 and No. 13 indicates clearly that such is not the case. The Sewell Coal occurs in boring No. 11 at a depth of 53 feet and the top of the Mauch Chunk is shown at a depth of 828 feet. In boring No. 13 the top of the Mauch Chunk reds is shown at a depth of only 505½ feet and the coal in question was opened some nine feet above the top of the boring. The correlation indicated by these borings was verified by the junior author by tracing the outcrop of the various sandstones from the location of Boring No. 11, to Grassy Knob, thence along Old Field Mountain to Little Clear Creek Mountain.

Numerous measured sections, results of chemical analyses, and an estimate of the available tonnage of the Beckley Coal are published in Chapter XI. The probable area of minable Beckley Coal is shown on Figure 19, and its stratigraphic position is shown in the records of Borings Nos. 5, 5A, 5B, 5C, 5D, 5F, 5G, 5H, 5K, 6, 11, 12, and 14. Its outcrop is not delineated on Map II, but it is easily plotted thereon by use of the green structure contours and the table of intervals published in Chapter IV.

In the vicinity of Anjean the occurrence of this seam is quite erratic or its interval below the Sewell Coal is extremely variable. No. 7 Pocahontas Coal, which will be described on a subsequent page, is locally (erroneously) called the "Beckley" Coal.

QUINNIMONT SANDSTONE.

The **Quinnimont Sandstone** of White[53], named from its occurrence near the town of Quinnimont, Fayette County, was noted at a number of points in Greenbrier County. It is generally a hard, gray, massive, medium-grained sandstone and it is particularly hard and quartzitic in the vicinity of Anjean. Its thickness is quite variable. The stratigraphic

[53]White, I. C., Vol. II(A), W. Va. Geol. Sur., p. 13; 1908.

position and character of the Quinnimont Sandstone are shown in the Sims Mountain—North End Section and in the records of Borings Nos. 5A, 5B, 5D, 5F, 5G, 5H, 5I, 5K, 6, 12, 13, and 14.

QUINNIMONT SHALE.

The **Quinnimont Shale** of Campbell[54], named for its occurrence near the town of Quinnimont, Fayette County, occupies, together with the sandstone last described, the interval between the Beckley and Fire Creek Coals. In general it is dark gray and sandy with a variable thickness that in part compensates for the variations in thickness of the overlying sandstone. Due to its erratic thickness and sandy character it was rarely identified by name, in the measured sections or cores.

FIRE CREEK COAL.

The **Fire Creek Coal** of White[55] was named from its occurrence in the vicinity of Fire Creek and Quinnimont, Fayette County, where it has long been mined on a commercial scale. In general it is multiple-bedded, soft, and ranges from a thin film to seven feet in thickness. There are no mines operating in this seam in Greenbrier County at the present (1936) time. On Little Clear Creek Mountain there is a large area of Fire Creek Coal with a thickness in excess of five feet, but over much of the county it rarely exceeds three feet. The stratigraphic position of the Fire Creek Coal is shown in the Sims Station and Big Clear Creek Mountain Sections and in the records of Borings Nos. 5, 5A, 5B, 5D, 5F, 5H, 5I, 11, 13, and 14. In Chapter XI, numerous measured sections are given, as well as chemical analyses and an estimate of the available tonnage. Figure 20 shows the probable area of minable coal and the position of the outcrop of this seam is delineated on Map II.

The Fire Creek Coal, as herein correlated, should not be confused with the seam that many of the residents of the county call "Fire Creek." In western Greenbrier and eastern Fayette Counties considerable coal is being produced from the No. 6 Pocahontas Coal. It is this seam that is usually called "Fire Creek" by the residents of the area.

[54]Campbell, M. R., Raleigh Folio, No. 77, U. S. Geol. Sur., 1902.

[55]White, I. C., Bull. 65, U. S. Geol. Sur., p. 197, 1891, and Vol. II(A), W. Va. Geol. Sur., pp. 179-185, 1908.

LITTLE FIRE CREEK COAL.

The **Little Fire Creek Coal** of White[56], named from its association with the coal last described, is represented in Greenbrier County by a multiple-bedded, soft, columnar coal that varies in thickness from a few inches to slightly over two feet. It is frequently absent or represented by black shale. On Boggs Knob and Little Sewell Mountain small truck mines have been opened in this seam. As noted above it is quite irregular in occurrence and thickness and this together with the small area in which the seam appears to average even two feet thick prevents its classification as minable. This coal will, no doubt, continue for some time to furnish a small amount of fuel for local use. The following openings in the Little Fire Creek Coal were noted in Meadow Bluff District:

Meadow River Lumber Company Mine—No. 371 on Map II.

On west side of Boggs Knob, 2 miles southeast of Sims; **Little Fire Creek Coal**; elevation, 3255′ B.

			Ft.	In.
Coal, bony (slate roof)	0′	4″		
Coal, clean, columnar (shale floor)	2	0	2	4

A sample (No. 87PH) was taken from the above section, the analysis of which is published under No. 371 in the Table of Coal Analyses at the end of Chapter XI.

Hennen[57], visited the same mine about 1918 and measured and sampled the coal. He reports the following:

			Ft.	In.
Coal, bony, 6″ to	0′	8″		
Coal, soft	1	11	2	7

A sample (No. 925H) was collected by him, the results of which are republished under No. 371 in the Table of Coal Analyses at the end of Chapter XI.

On the north side of Boggs Knob this coal has a thickness of two feet at **Coal Prospect No. 372 on Map II**, with an elevation of 3200′ B.

[56]White, I. C., Vol. II(A), W. Va. Geol. Sur., pp. 22 and 25, 1908.
[57]Hennen, Ray V., Fayette Report, pp. 218 and 320, 1919.

A chocolate-colored shale three feet thick and carrying thin streaks of coal appears to represent the Little Fire Creek Coal on the north end of Sims Mountain **(Coal Exposure No. 373 on Map II)**, shown in the Sims Mountain—North End Section published in Chapter V.

Wm. Bennett Mine—No. 374 on Map II.

On Wm. Bennett land, on Little Sewell Mountain, 2.25 miles southwest of Rupert and 1.55 miles northeast of Meadowvale School; **Little Fire Creek Coal**; elevation, 3285′ B.

			Ft.	In.
1. Sandstone, brownish-white, massive, to top of hill			65	0
2. Shale, dark			4	5
3. **Coal**, bony, hard	0′	4″		
4. **Coal**, banded	0	11		
5. **Coal**, hard	0	4		
6. **Coal**, soft, (fire clay floor)	1	2	2	9

A sample (No. 134PH) was collected from Nos. 3, 4, 5, and 6 of the above section, the analysis of which is published under No. 374 in the Table of Coal Analyses at the end of Chapter XI. The opening was not driven in very far, so the analysis may not truly represent the clean coal.

On the south end of Little Sewell Mountain a blossom of coal was noted at the Little Fire Creek horizon as shown in the Little Sewell Mountain—South End Section, published in Chapter V. This exposure is **No. 375 on Map II.**

As shown in the Big Clear Creek Mountain Section in Chapter V, a few inches of coal was noted at exposure **No. 375A on Map II**, on Big Clear Creek Mountain, that apparently represents the Little Fire Creek Coal.

Gauley Coal Land Co. Prospect No. A410—No. 376 on Map II.

On the southeast side of Job Knob Branch, 0.7 mile northeast of mouth; **Little Fire Creek Coal?**; elevation, 3583′ L.

	Ft.	In.
Coal	1	6

Gauley Coal Land Co. Prospect No. A253—No. 377 on Map II.

On north side of Joe Knob, 1.05 miles southeast of mouth of Smokehouse Branch; **Little Fire Creek Coal?**; elevation, 3561′ L.

			Ft.	In.
Coal	1′	2″		
Coal and slate (fire clay floor)	3	2	4	4

Gauley Coal Land Co. Prospect No. A252—No. 378 on Map II.

On the north side of Joe Knob, 1.05 miles southeast of mouth of Smokehouse Branch; Little Fire Creek Coal?; elevation, 3384′ L.

				Ft.	In.
Coal and bone (slate roof)	0′	1″			
Coal	1	2			
Slate	0	1½			
Coal	0	2½			
Coal and slate	0	3½			
Coal (slate floor)	1	0	....	2	10½

The stratigraphic position of the Little Fire Creek Coal is shown in the records of Borings Nos. 5I and 11.

PINEVILLE SANDSTONE.

The **Pineville Sandstone** of Hennen[58], named from its occurrence near the town of Pineville, Wyoming County, is a prominent sandstone over much of the region of its outcrop. It is generally massive, grayish-white, coarse-grained, with a variable thickness and occasionally its position in the column is occupied by shale. Its thickness and stratigraphic position are shown in the Little Clear Creek, Sims Station, and Big Clear Creek Mountain Sections and in the records of Borings Nos. 5A, 5B, 5G, 6, 11, 13, and 14.

NO. 9 POCAHONTAS COAL.

The **No. 9 Pocahontas Coal** of White[59] and Hennen[60], belonging immediately below the sandstone last described was not observed at outcrop but was noted in the records of Borings Nos. 5B, 5C, 5I, 11, and 14. It is generally only a few inches thick and as it occurs only a few feet above the No. 8 Pocahontas Coal, it can be distinguished from No. 8 only if both coals are present.

NO. 8 POCAHONTAS COAL.

The **No. 8 Pocahontas Coal** of White[61] and Hennen[62] is the basal member of the New River Group as classified in the Gen-

[58]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 211-12; 1915.

[59]White, I. C., Vol. II(A), W. Va. Geol. Sur., pp. 102 and 177, 1908.

[60]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 212-213, 1915.

[61]Ibid., p. 177.

[62]Ibid., pp. 213-214.

eral Section given on an earlier page. In Greenbrier County this coal may attain a thickness of four feet or over, including partings, but it is usually quite impure. Its blossom is noted in the Big Clear Creek Mountain Section (at **Exposure No. 378A on Map II)**, and its stratigraphic position is shown in the records of Borings Nos. 5A, 5B, 5C, and 14. In addition what appears to be the blossom of the same coal was noted on the Cold Knob road at **Coal Exposure No. 378B on Map II.**

DESCRIPTION OF MEMBERS, POCAHONTAS GROUP.

The Pocahontas Group or Lower Pottsville of White[63], beginning at the top with the Flattop Mountain Sandstone and extending down through the rock column to the top of the Mauch Chunk red shales of the Mississippian, attains a maximum thickness of slightly over 300 feet in the southwestern part of the county but is absent in the northern part. The contact of this Group with the overlying New River Group is not clearly defined in many parts of Greenbrier County and it is often necessary to ignore this boundary in the measured sections and in the records of coal test borings.

As discussed under "Correlation, Pottsville Series" on a previous page, the tracing of individual beds of the Pocahontas Group is extremely difficult, due to its thinning and disappearance and to the lenticularity of the coal beds. The sequence of beds can be resolved into a general column that follows the standard column for southern West Virginia. In general, the Pocahontas Group contains a greater percentage of shale than does the New River Group.

The character and stratigraphic position of the various members are shown in the General Section of the Pottsville Series published in an earlier page of this Chapter. In Chapter V numerous measured sections show the character of the sediments at various points.

FLATTOP MOUNTAIN SANDSTONE.

The Flattop Mountain Sandstone of White[64] and Hennen[65], named from its occurrence on the summit of Flattop Moun-

[63]White, I. C., Vol. II(A), W. Va. Geol. Sur., p. 13, 1908.

[64]Ibid., pp. 13-14.

[65]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 216-17, 1915.

tain, 2 miles northeast of Pocahontas, Virginia, and coming at the top of the Pocahontas Group, was noted at various points in Greenbrier County. In general, it is hard, medium-grained, usually micaceous, bluish-gray to brown, with a thickness ranging between 10 and 40 feet. It is not usually well exposed at outcrop and as a result it is difficult in many places to separate the New River and Pocahontas Groups. In the general vicinity of Duo the Flattop Mountain Sandstone apparently coalesces with the Pierpont Sandstone, cutting out the beds that normally occur between the two sandstones. The character and stratigraphic position of the Flattop Mountain Sandstone are exhibited in the Sims Station Section and in the records of Borings Nos. 5B, 6, 11, 12, 13, and 14. The top of this sandstone is generally 400 to 450 feet below the Sewell Coal.

RIFT SHALE[66], No. 7 POCAHONTAS COAL[67], PIERPONT SANDSTONE[68], ROYAL SHALE[69], No. 6 POCAHONTAS COAL[70].

In Greenbrier County and the adjoining parts of Nicholas and Fayette Counties, that part of the Pottsville Series between the base of the Flattop Mountain Sandstone and the top of the Eckman Sandstone often carries three coal beds and may contain as many as five or more. In some places the number of seams depends upon whether a succession of coal, shale, and coal, is a single bed with a parting, or two coals with an intervening shale member. It was observed that at different places first one and then the other of these coals may show the best section. The exact correlation of these seams, over any considerable area, is very difficult and in some cases the correlations are little more than a guess. The correlation of the zone, however, can be established with a reasonable

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References to the type localities of the above beds are:

[66]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., p. 217, 1915.

[67]White, I. C., Vol. II(A), W. Va. Geol. Sur., pp. 102-4, 1908; and Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 217-18, 1915.

[68]Hennen, Ibid., pp. 218-19.

[69]Krebs, C. E., Raleigh Report, W. Va. Geol. Sur., pp. 366-7, 1916.

[70]White, I. C., Vol. II(A), W. Va. Geol. Sur., pp. 103-4, 1908; and Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 221-2, 1915.

degree of certainty and if the exposures are good, the No. 6 Pocahontas Coal can usually be recognized.

The **Rift Shale**, belonging between the Flattop Mountain Sandstone and the No. 7 Pocahontas Coal, is no doubt present in Greenbrier, but the exact equivalent of the Rift Shale of the type locality is unknown.

The designation of a coal as the **No. 7 Pocahontas Coal** in this Chapter as well as in Chapter XI, means that the coal occurs between the Flattop Mountain Sandstone and the Eckman Sandstone and that it is apparently above the No. 6 Pocahontas Coal. Numerous measured sections of No. 7 Pocahontas Coal and several chemical analyses are given in Chapter XI. Its stratigraphic position is shown in the Big Clear Creek Mountain and Little Sewell Mountain Sections and in the records of Borings Nos. 5A, 5B, 5C, 13, and 14. A coal that is provisionally correlated as the No. 7 Pocahontas Coal is mined locally at Charmco and on Big Clear Creek Mountain. This seam is known locally as the "Beckley" and is sometimes referred to as the "Dirty Seam" due to the fact that it often has a "high" ash content. The so-called "Dirty Seam" is believed to have a "high" ash content only because it is compared to the extremely pure coal from seams above and below it. Analyses of this "dirty" coal show an ash content of from 6 to 9 per cent., which, in many areas, would be considered a low-ash content.

The **Pierpont Sandstone** was noted in the records of Borings Nos. 6, 11, 12, 13, 14, and 15, all near or east of Duo. In the general vicinity of Charmco, the position of this sandstone is usually occupied by shale that may contain one or more coals.

The **Royal Shale** was noted at several points in connection with the No. 6 Pocahontas Coal. It is dark to black and carries the fossil shell **Lingula**, which is common to most black shales in the Pottsville.

The **No. 6 Pocahontas Coal** is believed to be the most persistent of the coals in this zone. It is mined commercially at the Greenbrier Fire Creek Coal Company "Midland" mine west of Charmco and at other mines in the edge of Fayette County. This seam is usually referred to as "Fire Creek Coal"

or "Laurel Creek Seam" by mine operators and residents. Numerous measured sections, the results of chemical analyses, and an estimate of the available tonnage are published in Chapter XI. The stratigraphic position of the No. 6 Pocahontas Coal is shown in the Little Clear Creek, Sims Station, Little Sewell Mountain—West Side and South End, Big Clear Creek Mountain, and Sims Mountain—North End Sections, and in the records of Borings Nos. 5C, 6, 11, 12, 13, 14, and 15. Figure 21 shows the probable minable area of the No. 6 Pocahontas Coal and its outcrop is outlined in blue on Map II.

The chemical analyses of the No. 6 Pocahontas seam show it to be an excellent fuel. The volatile matter is low, the ash content is very low, the fusion point of the ash is high, and the B. T. U. is high; all of which are highly desirable qualities for a domestic fuel. This seam is destined to play a more and more important role in the production of coal in Greenbrier County.

The type was set up on Chapter XI (Commercial Coal) before the Chapter on Stratigraphy of the Pottsville was written. Due to an oversight, one of the coal exposures of No. 6 Pocahontas Coal marked on Map II was omitted from that Chapter and as a result it is necessary to include a record of the exposure here:

Coal Exposure No. 414A on Map II.

Meadow Bluff District; on public road, on Sims Mountain, 0.4 mile southwest of Sims School and 1.4 miles east-southeast of Sims (R. R. Station); **No. 6 Pocahontas Coal**; elevation, 3000′ B.

Coal blossom, thickness undetermined.

ECKMAN SANDSTONE.

The Eckman Sandstone of Hennen[71], named from its occurrence at the town of Eckman, McDowell County, is a lenticular, brown to gray, sandstone in Greenbrier County. The bed has no distinguishing characteristics and as a result it was rarely identified in measured sections or cores. Its thickness and stratigraphic position are shown in the General Section and in the records of Borings Nos. 5A and 11.

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[71]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 221-2, 1915.

NO. 5 POCAHONTAS COAL[72] AND NO. 4 POCAHONTAS COAL[73].

The **No. 5 Pocahontas Coal** and **No. 4 Pocahontas Coal** occur so close together and are so similar in Greenbrier County that they are difficult to differentiate. On Big Clear Creek Mountain a coal was noted at **Exposure No. 468 on Map II** that is believed to represent the No. 5 Pocahontas Coal. A thickness of 0.2 foot of coal was shown at this exposure as published in the Big Clear Creek Mountain Section in Chapter V.

Since the **No. 4 Pocahontas Coal** is believed to be the more continuous of these two coals, when only one seam is exposed at this horizon, it has been designated as the **No. 4 Pocahontas Coal**. The following exposures and prospects were noted in Meadow Bluff District:

Coal Exposure No. 469 on Map II is published in connection with the Sims Station Section in Chapter V.

Coal Exposure No. 470 on Map II is published in connection with the Sims Mountain—North End Section in Chapter V.

Coal Prospect No. 471 on Map II.

On the west side of Goddard Mountain, 1.8 miles southeast of East Rainelle; **No. 4 Pocahontas Coal**; elevation, 2950' B.

			Ft.	In.
Coal	0'	1"		
Shale	0	3		
Coal	0	1		
Shale	0	4		
Coal (slate floor)	0	10	1	7

Coal Exposure No. 472 on Map II is published in connection with the Little Sewell Mountain—West Side Section in Chapter V.

Gauley Coal Land Co. Coal Prospect 605A—No. 473 on Map II.

On east side of Mill Creek, 2.45 miles southeast of Charmco and 2.1 miles north of Rupert; **No. 4 Pocahontas Coal**; elevation, 2908' L.

	Ft.	In.
Coal and slate	2	6

[72]White, I. C., Vol. II(A), W. Va. Geol. Sur., p. 104, 1908.

[73]Lathrop, W. A., "The Virginias," p. 97, June, 1884; and White, I. C., Vol. II(A), W. Va. Geol. Sur., pp. 103-4, 1908.

Gauley Coal Land Co. Coal Prospect 605—No. 474 on Map II.

On the east side of Mill Creek, 2.6 miles southeast of Charmco and 1.89 miles north of Rupert; No. 4 Pocahontas Coal; elevation, 2939′ L.

			Ft.	In.
Coal (sandstone roof)	0′	2″		
Fire clay	3	6		
Coal	0	6		
Bone	0	1		
Coal (fire clay floor)	1	0	5	3

Gauley Coal Land Co. Coal Prospect 604—No. 475 on Map II.

On the east side of Mill Creek, 2.35 miles southeast of Charmco and 1.9 miles northwest of Rupert; No. 4 Pocahontas Coal; elevation, 2907′ L.

			Ft.	In.
Coal (sandstone roof)	0′	6″		
Sandstone	4	0		
Coal	0	8		
Bone	0	4		
Coal (fire clay floor)	2	6	8	0

Gauley Coal Land Co. Coal Prospect 600A—No. 476 on Map II.

On south end of Big Clear Creek Mountain, 2.35 miles southeast of Charmco and 1.6 miles northwest of Rupert; No. 4 Pocahontas Coal; elevation, 2907′ L.

	Ft.	In.
Coal and slate	1	4

Coal Exposure No. 477 on Map II is published in connection with the Big Clear Creek Mountain Section in Chapter V.

Gauley Coal Land Co. Coal Prospect 600—No. 478 on Map II.

On west side of Big Clear Creek, 1.45 miles north of Rupert; No. 4 Pocahontas Coal; elevation, 3050′ L.

	Ft.	In.
Coal and bone	2	7

Gauley Coal Land Co. Coal Prospect No. A409—No. 479 on Map II.

On the north side of Little Clear Creek Mountain, 0.6 mile south of mouth of Old Field Branch; No. 4 Pocahontas Coal?; elevation, 3376′ L.

			Ft.	In.
Coal (slate roof)	2′	3″		
Slate	2	6		
Coal	0	3		
Slate	0	4		
Coal (fire clay floor)	1	4½	6	8½

Gauley Coal Land Co. Coal Prospect No. A408—No. 480 on Map II.

On the north side of Little Clear Creek Mountain, 0.55 mile southwest of mouth of Old Field Branch; **No. 4 Pocahontas Coal?**; elevation, 3402′ L.

	Ft.	In.
Coal	1	8

Gauley Coal Land Co. Coal Prospect No. A407—No. 481 on Map II.

On the north side of Little Clear Creek Mountain, 1.15 miles east of mouth of Smokehouse Branch and 0.8 mile southwest of mouth of Old Field Branch; **No. 4 Pocahontas Coal?**; elevation, 3398′ L.

	Ft.	In.
Coal	1	9

Gauley Coal Land Co. Coal Prospect No. A400—No. 482 on Map II.

On south side of Little Clear Creek Mountain near head of Little Clear Creek, 2.1 miles northeast of mouth of Kuhn Branch; **No. 4 Pocahontas Coal**; elevation, 3481′ L.

	Ft.	In.
Coal (sandstone roof; slate floor)	1	7

UPPER POCAHONTAS SANDSTONE.

The **Upper Pocahontas Sandstone** of Hennen[1], named from its occurrence at Pocahontas, Virginia, appears to be represented in the vicinity of Charmco and Rainelle. It is generally massive, medium- to coarse-grained, gray to brown, and lenticular. Its character and stratigraphic position are shown in the Sims Mountain North End Section and in the records of Borings Nos. 11, 13, and 14.

NO. 3 POCAHONTAS "RIDER" COAL.

The **No. 3 Pocahontas "Rider" Coal** of Hennen[2], was questionably identified at a few localities in Greenbrier County. One of the few exposures was at **No. 483 on Map II** on the Cold Knob road, where a coal blossom of undetermined thickness was noted at an elevation of 4080′ B. Its character and stratigraphic position are shown in the General Section and in the record of Boring No. 5C.

[1] Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp 224-5, 1915.

[2] Ibid., p. 226

NO. 3 POCAHONTAS COAL.

The **No. 3 Pocahontas Coal** of Lathrop and White[76], named for its occurrence at Pocahontas, Virginia, was observed at numerous points in southwestern Greenbrier County. From a stratigraphic standpoint, it is believed to be the lowest minable coal bed in the territory of this report. This seam has been mined for local use at a few points, but at present (1936), none of these mines are in regular operation. Many measurements of No. 3 Pocahontas Coal, results of analyses, and an estimate of the available tonnage, are published in Chapter XI. The character and stratigraphic position of this seam are shown in the Goddard Mountain, Little Sewell Mountain—West Side, Little Sewell Mountain—South End, Sims Station, Big Clear Creek Mountain, and Little Clear Creek Sections published in Chapter V, and in the records of Borings Nos. 13, 14, and 15, published in Chapter XI. Figure 23 shows the probable minable area of No. 3 Pocahontas Coal and the position of the horizon of the seam on Map II is easily found by reference to the green structure contours and to the table of intervals published in Chapter IV.

LOWER POCAHONTAS SANDSTONE.

The **Lower Pocahontas Sandstone** of Hennen[77], is thick-bedded, medium-grained, and lenticular in Greenbrier County. Its character and stratigraphic position are shown in the General Section and in the records of Borings Nos. 11, 13, and 14.

NO. 2 "A" POCAHONTAS COAL.

The **No. 2 "A" Pocahontas Coal** of Hennen[78], was not observed at outcrop but was tentatively identified in the records of Borings Nos. 11 and 14, where it is only a few inches thick.

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[76]Lathrop, W. A., "The Virginias," p. 97, June, 1884; and White, I. C., Bull. 65, U. S. Geol. Sur., pp. 203-4, 1891; Vol. II, W. Va. Geol. Sur., pp. 689-690, 1903; and Vol. II(A), W. Va. Geol. Sur., pp. 103-104, 1908.

[77]Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 228-230, 1915.

[78]Ibid., p. 230.

NO. 2 POCAHONTAS COAL.

The **No. 2 Pocahontas Coal** of Lathrop and White[79] was tentatively identified in the Sims Station Section and in the records of Borings Nos. 11, 13, and 14. The horizon is marked by black shale and may carry a few inches of coal.

In a few of the coal test borings, a sandstone was reported below what was believed to be the No. 2 Pocahontas Coal. This sandstone may represent the **Vivian Sandstone** of Hennen[80].

NO. 1 POCAHONTAS COAL.

A coal seam that is believed to represent the **No. 1 Pocahontas Coal** of Lathrop and White[81] was observed in the vicinity of Charmco. The following prospect was noted:

Ed. Grafton Coal Prospect—No. 501 on Map II.

On north side of Meadow River, 0.35 mile northwest of Charmco; No. 1 Pocahontas Coal?; elevation, 2470′ B.

	Ft.	In.
Coal, very dull lustre, partly concealed, reported by L. E. McClung to have a total thickness of....	3	4

A sample (No. 140PH) was collected from the portion exposed (about 2 feet thick) for chemical analysis. The analysis is published under **No. 501** in the Table of Coal Analyses at the end of Chapter XI.

The character and stratigraphic position of this seam are shown in the Sims Mountain—North End Section **(at Exposure No. 500 on Map II)**, in the Charmco Section **(at Exposure No. 502 on Map II)**, and in the records of Borings Nos. 11, 12, and 13.

79Lathrop, W. A., "The Virginias," p. 97, June, 1884; and White, I. C., W. Va. Geol. Survey, Vol. II, pp. 689-690, 1903; and Vol. II(A), pp. 103-104, 1908.

80Hennen, Ray V., Wyoming-McDowell Report, W. Va. Geol. Sur., pp. 232-234, 1915.

81Lathrop, W. A., "The Virginias," p. 97, June, 1884; and White, I. C., W. Va. Geol. Sur., Vol. II, pp. 689-690, 1903; and Vol. II(A), pp. 103-4, 1908.

ECONOMIC ASPECTS, POTTSVILLE SERIES.

From an economic standpoint, the Pottsville Series is the most important subdivision of the exposed rock column of Greenbrier County. It contains five minable coal seams and at least three other seams show a minable section in certain parts of the county. These are, in descending order, the Sewell, Little Raleigh, Beckley, Fire Creek, No. 6 Pocahontas, and No. 3 Pocahontas. Of these, the Sewell Coal is by far the most important, although the No. 6 Pocahontas Coal is rapidly gaining in importance.

Aside from the coal, however, the rocks of the Pottsville Series contain few materials of economic importance. Many of the sandstones are suitable for various types of masonry structures, but the lack of a near-by market limits their use for this purpose at the present time. Others show sufficient purity to be a source of silica sand suitable for the several uses to which such silica is adapted. The series contains no true fire clays of any consequence in this county.

CHAPTER VII.

STRATIGRAPHY—MISSISSIPPIAN ROCKS.

GENERAL STATEMENT.

The rocks of the Mississippian Period outcrop in a broad band, trending in a northeast-southwest direction across the center of Greenbrier County. In descending order these rocks are subdivided as follows:

	Feet.
Mauch Chunk Series:	
Bluestone Group	80 to 675
Princeton Conglomerate	20 to 80
Hinton Group	500 to 850
Bluefield Group	900 to 1200
Greenbrier Series	475 to 700
Maccrady Series	60 to 250
Pocono Series	200 to 600
Totals	2235 to 4355

The above minimum-maximum thicknesses only apply to the outcropping rocks. It is reasonably certain that a well drilled in the northern or extreme western part of the county would find thicknesses that are less than the minimum figures given above. The description of the groups now follows in descending stratigraphic order.

CORRELATION, MISSISSIPPIAN PERIOD.

In view of the present available information along with conflicting opinions as to the relative ages of different groups, a proper and satisfactory correlation of the lithologic units of the Mississippian, with their equivalents in other areas, will not be obtained until each is studied in its entirety. If one is to compile a geologic and economic report on a large area within a reasonable length of time, it is necessary that corre-

lations be largely based on the lithologic characteristics of the different beds and quite naturally the boundaries of these lithologic units may not correspond to the boundaries of paleontologic units in other areas. In some areas where the Mississippian has been divided into paleontologic units, its total thickness is measured in hundreds of feet and its units in tens of feet, whereas, in West Virginia the Mississippian may be measured in thousands of feet and its units may be hundreds of feet thick.

Mr. R. C. Tucker has recently compiled a chart showing the range of the fossils thus far reported from the Mississippian rocks of West Virginia, and this chart shows that very few of the fossils are confined to a single bed or even to a small group of beds. As a result the writers believe that it would be unwise to attempt to name interstate age equivalents in any but the most general terms.

It is clear that all of the Mississippian beds above the St. Louis Limestone as described by Weller[1] in Illinois, are represented in Greenbrier County and that the equivalent of the St. Louis Limestone is the basal member of the Greenbrier Series, as herein described. The upper limit of St. Louis beds or the limits of the equivalent of the St. Genevieve Limestone or even the limits of the Chester Group can not be stated with any degree of accuracy. It may be said, however, that there is no evidence to support the somewhat prevalent idea that the base of the Mauch Chunk Series corresponds roughly to the base of the Chester Group of Illinois. There is some evidence that both the lower beds of the Mauch Chunk Series and the upper part of the Greenbrier Series are of Chester age.

The Maccrady Series in this area is apparently non-fossiliferous, and its exact age in Greenbrier County is not known. Lithologically it resembles both the Mauch Chunk of upper Mississippian age and the Catskill of upper Devonian age.

The Pocono Series has always been considered Mississippian by the West Virginia Geological Survey, but it must be admitted that there is little to prove the age of the series in

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[1]Weller, Stuart, The Mississippian Brachiopoda of the Mississippi Valley Basin, Ill. St. Geol. Sur., 1914.

Greenbrier County. Professor Wells states that the fossils collected from the Pocono of Greenbrier County suggest its Mississippian age, but unfortunately the specimens are not complete enough to permit an unqualified statement.

MAUCH CHUNK SERIES.

GENERAL ACCOUNT AND SECTION, MAUCH CHUNK SERIES.

The Mauch Chunk Series, the upper division of the Missisipian, underlies the Pottsville Series of the Pennsylvanian. Its greatest thickness is along the Greenbrier-Summers County line where the series is approximately 2,800 feet thick. The least thickness of the series at the outcrop is at the Greenbrier-Pocahontas County line where it is approximately 1,900 feet thick. It is probable that a well drilled near the county line on North Fork of Cherry River would not find more than 1,400 feet of Mauch Chunk rocks and one drilled at Russellville would probably not find over 1,000 feet in this series. From the foregoing figures it is seen that the Mauch Chunk Series thins to the northwest at a very rapid rate. This thinning is a combination of a loss of thickness of individual beds and a loss of some of the Bluestone beds at the Pottsville-Mauch Chunk disconformity.

The rocks of the Mauch Chunk Series are composed of shales, sandstones, limestones, and a few impure coals. The proportion of one type of rock to another varies rapidly from place to place. Rocks of nearly every color common to sedimentary rocks may be found in this series but deep red or greenish-gray rocks are predominant.

The following general section illustrates the nature of the Mauch Chunk stratigraphic column in Greenbrier County:

General Section of the Mauch Chunk Series for Greenbrier County.

	Thickness. Feet.	Total. Feet.
Bluestone Group (80′ to 675′)		
Shales, red, with some green beds, occasional micaceous sandstone; may contain one or more thin, shaly limestone beds; contains two thin lenticular coaly shales	80-675	675
Princeton Group (20′ to 80′)		
Sandstone, greenish-gray, or stained reddish-brown by limonite; often a mass of pebbles and these are characteristically poorly sorted; occasional plant fossil	20- 80	755
Hinton Group (500′ to 850′)		
Shales, red, variegated, interbedded with green to red argillaceous sandstone, some beds highly calcareous; contains two or more thin coaly shales, near Kieffer	170-270	1025
Sandstone, gray to brown, often shaly, calcareous	0- 20	1045
Shale, calcareous, often quite sandy	0- 20	1065
Limestone, Avis, steel gray, may be stained yellow by weathering, shaly, very fossiliferous	10- 30	1095
Shales, red, variegated, interbedded with greenish-gray to red sandstones, some beds highly calcareous	290-460	1555
Sandstone, Stony Gap, greenish-gray, white or reddish-brown, massive, often cross-bedded, medium-grained, resistant to weathering	30- 50	1605
Bluefield Group (900′ to 1200′)		
Shales, mostly red, some green, some brown, interbedded with greenish-gray or reddish-brown sandstones; contains two or more thin shaly limestones	550-600	2205
Sandstone, Droop, gray, white or brown, medium-grained, massive, often strongly cross-bedded, sometimes carries carbonized plants	50-100	2305
Shale, yellow, olive, sandy	90-140	2445
Limestone, Reynolds, blue on fresh exposure, weathers yellow, usually impure, shaly, very fossiliferous	15- 40	2485
Shale, yellow, sandy, with streaks of red shale	70- 40	2525
Sandstone, Webster Springs, grayish-brown, medium-grained, shaly	10- 50	2575
Limestone, Glenray, gray, hard, siliceous or shaly, very fossiliferous	10- 60	2635
Shale, red to yellow, sandy	30- 40	2675
Shale, Lillydale, greenish-gray to yellow at top, dark at base, fissile, somewhat sandy in places; sometimes carries a lenticular sandstone (**Edray**) that may occur at top, base or within the shale	75-130	2805
Greenbrier Series	......	......

TOPOGRAPHIC EXPRESSION, MAUCH CHUNK SERIES.

In localities where there are no external modifying influences, such as the presence of overlying Pottsville beds or distortion by folds, the topography of the Mauch Chunk Series usually resolves itself into a series of haphazardly arranged ridges, each of which is capped by a hard sandstone and as a result has a more or less flat crest. From the edges of these crests the descent is usually abrupt until another durable sandstone interrupts the steep slope and forms a shelf. The same succession of steep, shaly slopes and sandstone benches may be repeated several times until the deep valley floor is reached. These valleys are usually narrow because of the apparently youthful cycle of the major streams, and raggedly V-shaped because of the benching of the hillsides.

AREAL EXTENT, MAUCH CHUNK SERIES.

Figure 9 shows at a glance the outcrop of this series in Greenbrier County, while on Map II the same outcrops are delineated in much greater detail. By this figure and map it is evident that approximately 25 per cent. of the surface rocks of the county are of the Mauch Chunk Series. A further examination of Figure 9 and Map II reveals that this series is limited to the portion of the county west of the Greenbrier River and comprising all that area west of the main Greenbrier Limestone belt with the exception of the areas covered by the Pottsville Series as seen on Figure 8 and the area of older rocks along the Williamsburg Anticline.

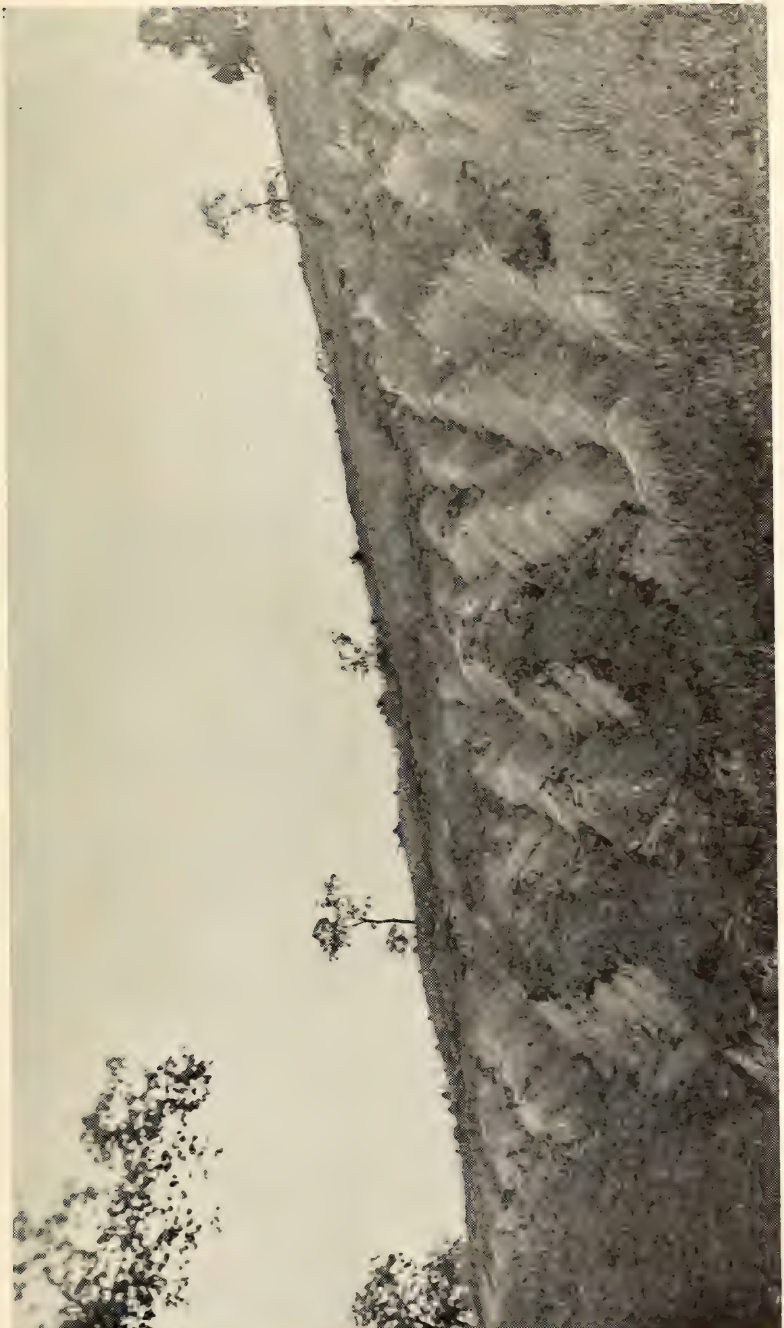

PLATE XIV. Gullying in the red shale of the Hinton Group of the Mauch Chunk Series, near Rupert. Photo. taken in 1930. See Plate XV for picture in 1931.

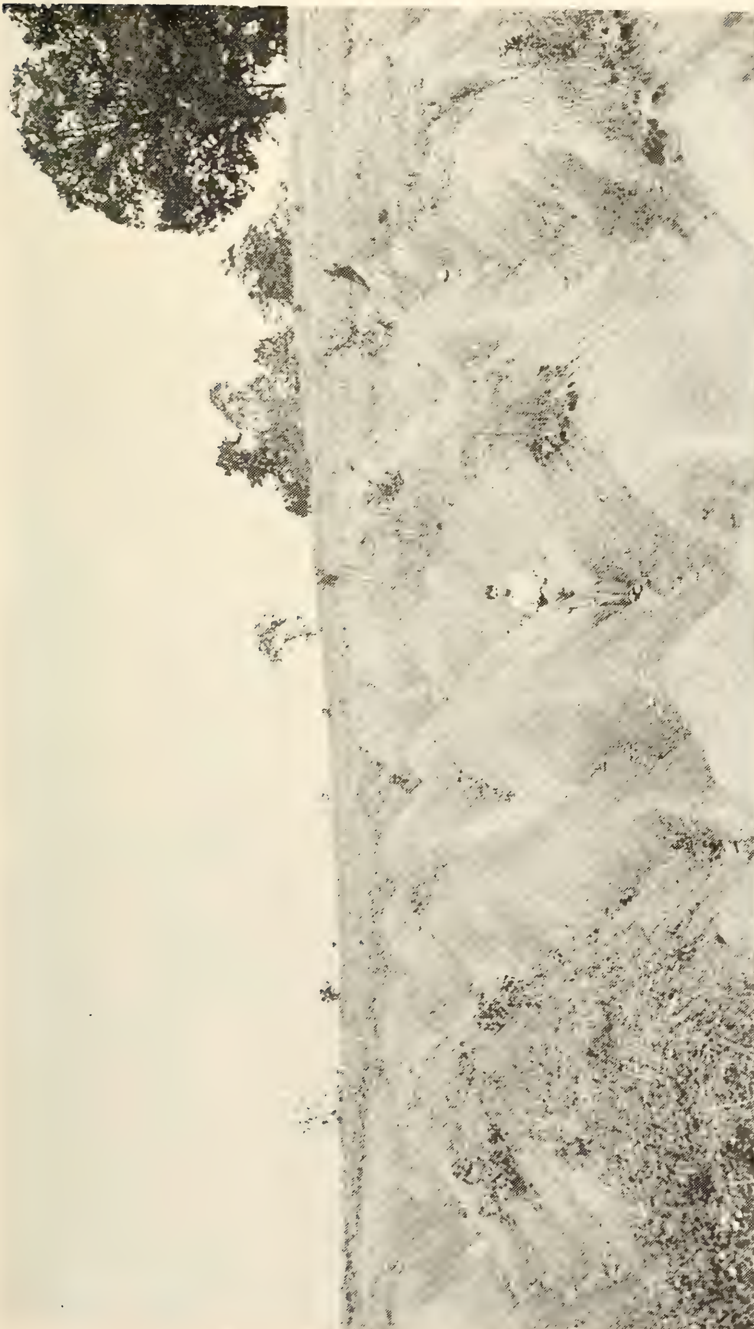

PLATE XV.—Gullying in the red shale of the Hinton Group of the Mauch Chunk Series, near Rupert. Gullies have deepened two to three feet in one year. Photo. taken in 1931. See Plate XIV for picture taken in 1930.

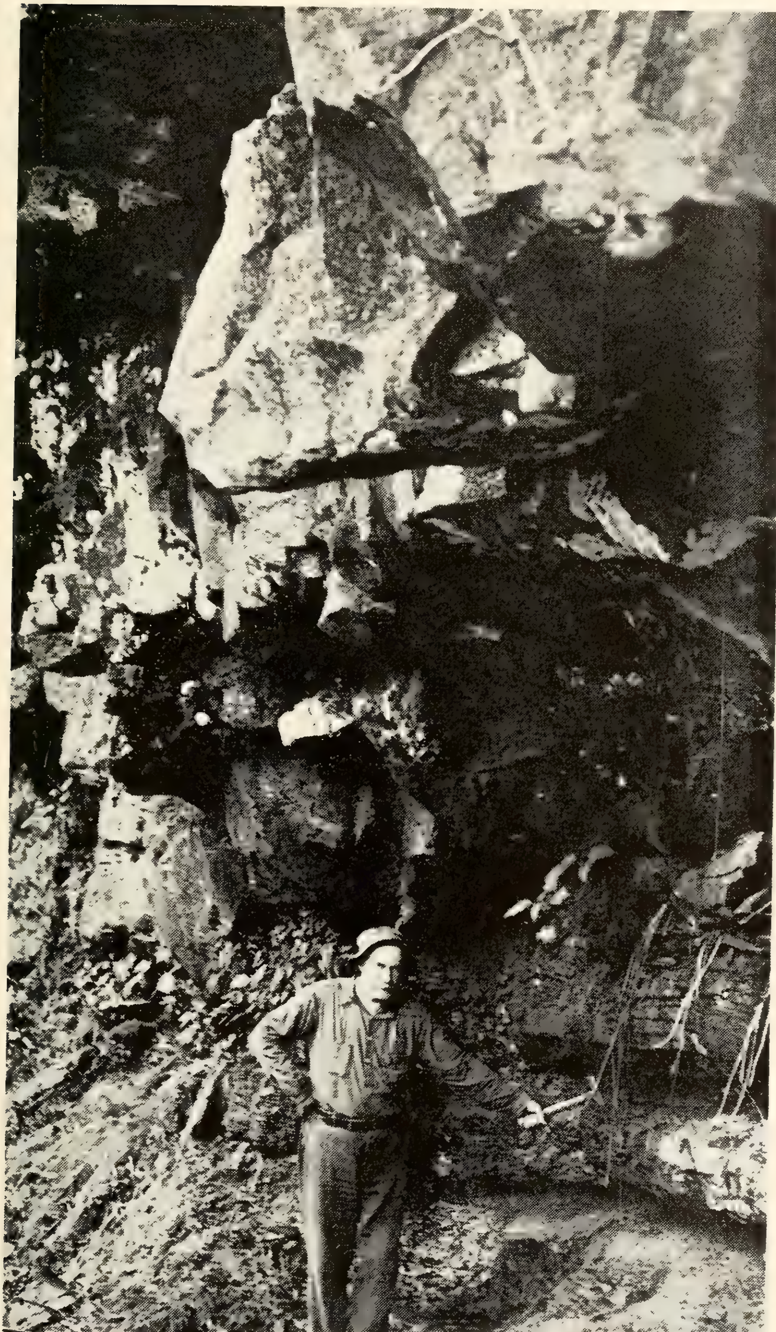

PLATE XVI.—Terry Limestone just below the Princeton Conglomerate on the South Fork of Cherry River.

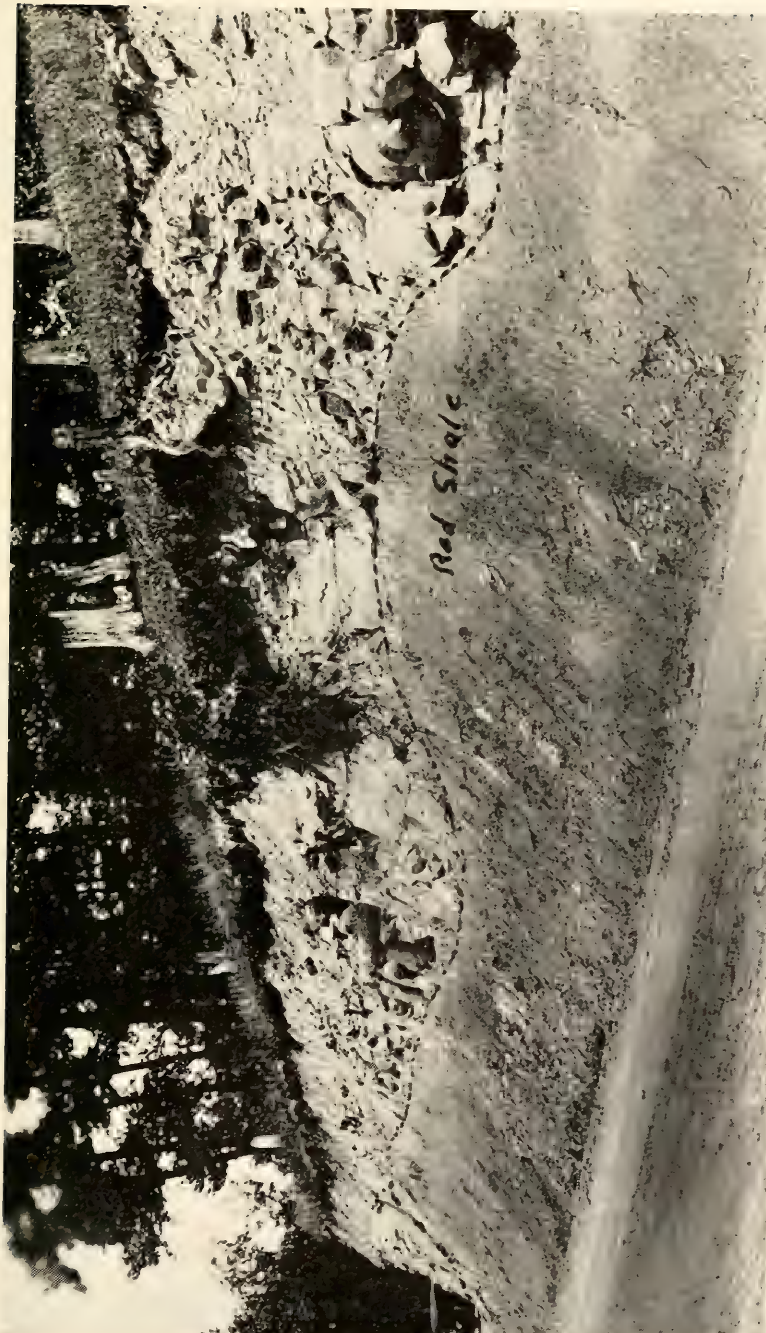

PLATE XVII.—Subaerial scouring in the Hinton Group of the Mauch Chunk along Midland Trail (U. S. Route 60), 1.2 miles southeast of Crawley.

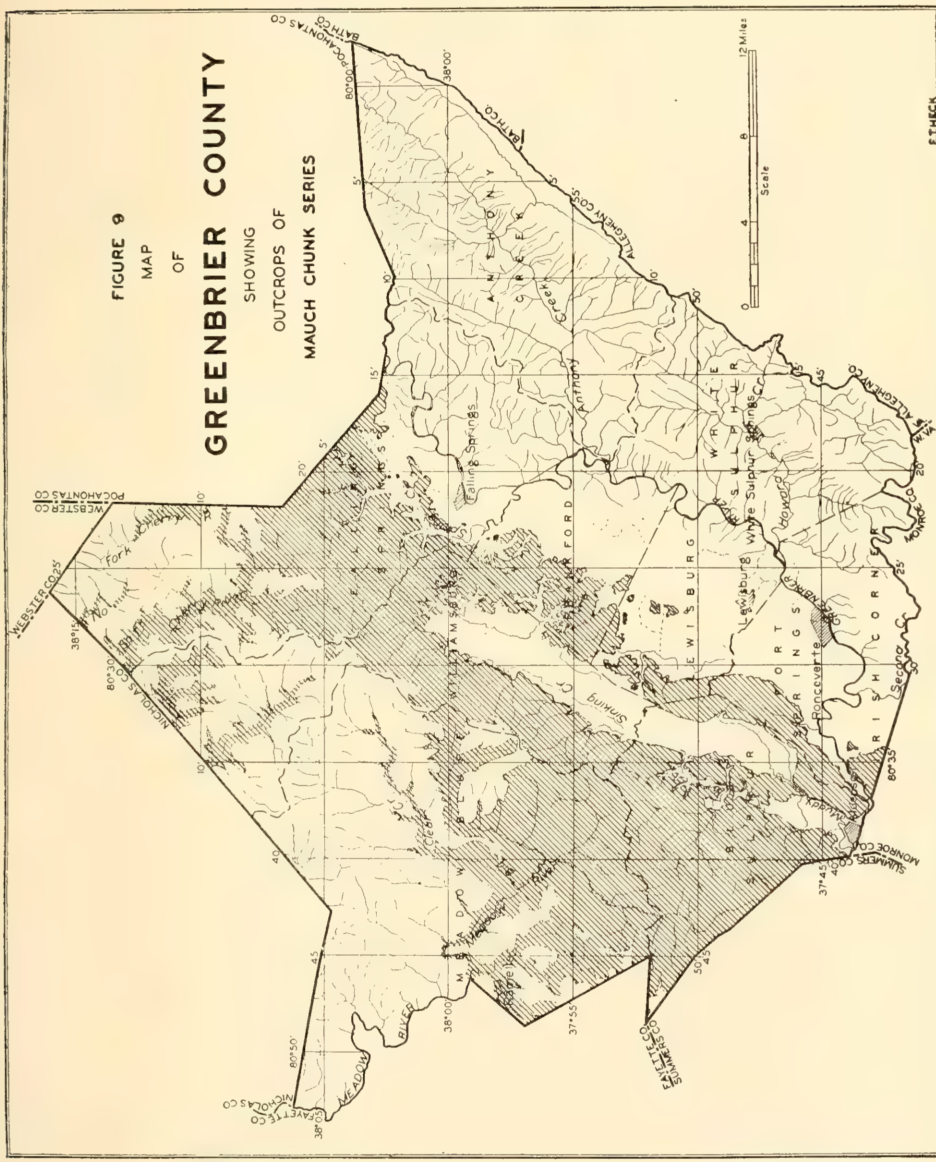
FIGURE 9
MAP
OF
GREENBRIER COUNTY
SHOWING
OUTCROPS OF
MAUCH CHUNK SERIES
Scale
12 Miles
Lewisburg
White Sulphur Springs
Ronceverte
Falling Springs
WEBSTER CO.
POCAHONTAS CO.
NICHOLAS CO.
FAYETTE CO.
SUMMERS CO.
MONROE CO.
ALLEGHENY CO.
BATH CO.

CONTACTS, MAUCH CHUNK SERIES.

The contact of the Mauch Chunk Series with the overlying Pottsville Series and the unconformity that exists between them have been discussed under the description of the latter series. At the base of the Mauch Chunk Series there is not the marked contrast with the underlying Greenbrier Limestone Series as there is with the overlying Pottsville, but the contact is one of gradual change rather than an abrupt break. Considering the two series as a whole there is a large difference, the Mauch Chunk consisting mainly of red shales and sandstones with occasional thin streaks of coal and with the basal portion carrying comparatively thin limestones and shales, while the Greenbrier Series is made up almost entirely of massive limestones. At the contact, however, the two series blend together lithologically as well as paleontologically.

FOSSIL LIFE, MAUCH CHUNK SERIES.

In the Mauch Chunk Series the fossils have changed materially from that at its type locality of reptile tracks and vertebrate remains, to a fauna composed almost entirely of marine shells with an occasional fish tooth, along with a variety of fossil plants. The fossils are distributed throughout the series but increase in number toward the base. No attempt was made to get a complete assemblage from this series, but collections were made at exposures where the fossils were well weathered out. These collections were studied by Professor Dana Wells and their identification will be found in Chapter XIV under the heading Notes on Paleontology. Several loose specimens of Stigmaria were collected but none of these appears under this heading. The collections from this series were made primarily from the Avis, Reynolds, and Glenray members.

CORRELATION, MAUCH CHUNK SERIES.

The Mauch Chunk Series of this report is the representative of the Mauch Chunk of Pennsylvania, (No. XI of the earlier Rogers' classification), except that in that State certain calcareous beds are included in the Mauch Chunk that appear to be the equivalent of the part of the Greenbrier Series of

West Virginia. To the southwest the Mauch Chunk correlates, in part, with the Pennington Shale of Virginia but apparently the Pennington includes nothing below the Stony Gap Sandstone and therefore does not include the Bluefield Group which is almost half of the Mauch Chunk in this county.

Reger[2] has made a very detailed study of the Mauch Chunk Series in Mercer, Monroe, and Summers Counties and in the report cited in the foot-note he described and named a large number of individual beds. In planning the field work for the report on Greenbrier County, it was deemed inadvisable to attempt the detailed work that would make the correlation of all individual beds possible. As a result, only the group boundaries and a few of the more prominent and continuous members are noted in measured sections in Chapter V and in the description of the series in this Chapter.

DESCRIPTION OF MEMBERS, BLUESTONE GROUP.

The lithologic characteristics of individual beds of the Bluestone Group vary rapidly from one place to another so that detailed correlation without almost continuous exposures is very difficult. It is quite clear, however, that from southeast to northwest successively older horizons are in contact with the basal beds of the Pottsville Series.

A coal seam, or more properly, a coaly shale, was noted in this group, that may represent the Hunt Coal of Reger[3]. One foot of coaly shale, occurring about 80 feet below the base of the Pottsville, was noted on the south end of Little Sewell Mountain and on Big Clear Creek Mountain; what appears to be the same bed was noted 30 feet below the base of the Pottsville. The elevation of these coal exposures as well as the succession of beds above and below them may be seen in the Little Sewell Mountain—South End, and the Big Clear Creek Mountain Sections, published in Chapter V.

In the general vicinity of Rockcliff and Kieffer there are several exposures of a coaly shale that belongs about 100 feet above the Princeton Conglomerate. This coaly shale may be the

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[2]Reger, David B., Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 291-444; 1926.

[3]Ibid., pp. 316-317.

equivalent of the Pipestem Coal of Reger[4]. The bed is never more than a few inches thick and is of no economic value.

Approximately 90 per cent. of the group is shale. Most of the shales are deep red in color but a few beds are green, yellow, brown, or dark gray. Some of the shales are calcareous. The sandstone making up the remaining 10 per cent. of the group is usually green, fine-grained, thin-bedded and shaly.

DESCRIPTION OF MEMBERS, PRINCETON GROUP.

PRINCETON SANDSTONE.

The **Princeton Sandstone**, or Princeton Conglomerate of Campbell[5], is a prominent marker in many parts of Greenbrier County. On each of the two forks of Cherry River in the northern part of the county it is the most prominent bed of the exposed Mauch Chunk. In that region, as in most places, it is strongly cemented with limonite and carries the characteristic large pebbles. The sand and pebbles are usually very poorly sorted and this characteristic, when used with some caution, makes it possible to distinguish this sandstone from any other in the region. Near Kieffer the Princeton is almost entirely composed of pebbles. About one mile west of Rupert characteristic drift boulders from this bed may be observed along the Midland Trail.

The character and stratigraphic position of the Princeton Sandstone are shown in the Goddard Mountain, Sims Station, Little Sewell Mountain—West Side, Little Sewell Mountain—South End, Cherry Low Place, Little Rocky Run, Kieffer, Roach Run, Cold Knob—Hinkle Well, Briery Knob, and Alderson Sections, published in Chapter V, and its outcrop is delineated on Map II.

DESCRIPTION OF MEMBERS, HINTON GROUP.

In Greenbrier County there is some evidence of a loss of some of the upper beds of the Hinton Group, by a disconformity. The lithology of the various upper beds is so similar, however, that without additional detailed field work it would be unwise

[4]Ibid., pp. 323-324.
[5]Campbell, M. R., Pocahontas Folio, No. 26, U. S. Geol. Sur., 1896.

to state definitely that such an unconformity exists. The Hinton Group is composed of approximately 70 per cent. shale, 25 per cent. sandstone, and 5 per cent. (or less) limestone.

The upper half of the Hinton Group is composed of shales and thin sandstones. The shales are predominantly red or variegated and some beds may be calcareous, while the sandstones are usually greenish-gray, thin-bedded and shaly. In the general vicinity of Kieffer, two or more thin, very impure coals were noted in this part of the Hinton Group.

AVIS LIMESTONE.

The **Avis Limestone** of Reger[6], formerly termed the **Hinton Limestone** by Krebs[7], is one of the most persistent and easily recognized members within the Hinton Group in Greenbrier County. It is usually steel gray in color although the top may be stained yellow on weathering. The limestone is sometimes divided into two benches, being separated by a thin bed of calcareous shale. Its character, thickness, and stratigraphic position are shown in the Kieffer, Roach Run, Alderson, and Cold Knob—Hinkle Well Sections, published in Chapter V.

This limestone has been quarried along the Midland Trail just east of Little Clear Creek and its possibilities as a quarry rock together with chemical analyses are discussed in Chapter XII.

Between the Avis Limestone and the Stony Gap Sandstone there are from 300 to 500 feet of red or variegated shales, interbedded with greenish-gray or red sandstones. Some of the beds are strongly calcareous and locally they may grade into limestones.

STONY GAP SANDSTONE.

The **Stony Gap Sandstone** of Reger[8], or **Hinton** of Stevenson, is present in Greenbrier County and forms the basal member of the Hinton Group. This sandstone was recognized

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[6]Ibid., pp. 347-351.

[7]C. E. Krebs, Raleigh County and Western Portions of Mercer and Summers Counties Report, W. Va. Geol. Sur., pp. 75, 76, and 88; 1916.

[8]David B. Reger, Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 371-378; 1926.

many years ago as an important key rock and was called the Hinton Sandstone by Dr. John J. Stevenson from its exposure near Hinton, Summers County, but apparently little recognition was given it. Later Campbell[a], applied the term "Hinton Formation" to a major group of rocks in the New River Valley, and its usage has become so well fixed in the geologic literature of West Virginia that it appears unwise to return to the earlier application, which would possibly lead to confusion. Reger has accordingly renamed this horizon the Stony Gap Sandstone from its occurrence at the village of that name in Mercer County, where it is well exposed. At its type locality it is described as being a light-gray or white, massive, coarse, and extremely hard and quartzitic ledge, varying in thickness from 35 to 85 feet.

In Greenbrier County this sandstone retains its same general character, being a gray to white, medium-grained, massive, hard, and quartzitic sandstone, but attaining no thickness greater than 50 feet. Its position can be noted in the measured sections containing the Mauch Chunk Series and located in detail from Map II as it forms the basal member of the Hinton Group which is thereon delineated.

So far as known no use has been made of this stratum for any purpose, but owing to its resistant character, its purity, and its pleasing appearance, it should be suitable for building stone and other local uses.

DESCRIPTION OF MEMBERS, BLUEFIELD GROUP.

The Bluefield Group is the largest subdivision of the Mauch Chunk Series and in Greenbrier County it is composed of 60 to 65 per cent. shale, 30 per cent. sandstone, and 5 to 10 per cent. limestone. In appearance the upper two-thirds of this group is quite similar to the upper groups of the Mauch Chunk but the bottom third is intermediate in appearance between the rest of the Mauch Chunk and the underlying Greenbrier Series. On ordinary hillside exposures it is sometimes difficult to tell where the Mauch Chunk-Greenbrier contact belongs.

[a]M. R. Campbell, Pocahontas Folio, No. 26, U. S. Geol. Sur.; 1896.

The upper 550 to 600 feet of the Bluefield Group is composed of shales and sandstones. The shales are mostly red but some green or brown beds were noted Many of the beds are calcareous and some may locally grade into limestone. The sandstones are greenish-gray or reddish-brown, usually thin-bedded, shaly, and fine-grained.

DROOP SANDSTONE.

The **Droop Sandstone** was named by Reger[10] from its occurrence on Droop Mountain, Pocahontas County. In Greenbrier County this sandstone is usually grayish-brown, massive, medium-grained, and hard. It is frequently cross-bedded and ripple-marked and sometimes carries carbonized plants. Its thickness, character, and stratigraphic position are noted in the Alum Run, Alta, Alderson, Butler Mountain, Hawver School—East, Cold Knob—Hinkle Well, and Richlands—Two Miles North Sections, published in Chapter V. In thickness this sandstone exceeds all other sandstones in the Mauch Chunk, frequently attaining a thickness in excess of 60 feet.

Due to the fact that it is much more resistant than the beds immediately above and below it, the Droop Sandstone is often found capping the ridges. Under such conditions, weathering often removes much of the iron in the sandstone, leaving a nearly pure silica sand that appears to have the properties of a glass-sand. In some localities the Droop Sandstone is strongly cemented with secondary silica and appears to be durable enough for road material. So far as known this sandstone has not been quarried in Greenbrier County for either purpose.

TALCOTT AND ADA SHALES.

A shale bed that is believed to represent both the **Talcott and Ada Shales** of Reger[11] was noted in the Renick Valley Section. A yellow to olive-green sandy shale 55 feet thick was noted immediately under the sandstone last described. Elsewhere these beds were not identified.

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[10]Reger, David B., Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 415-418; 1926.

[11]Ibid., pp. 418-426.

REYNOLDS LIMESTONE.

The **Reynolds Limestone,** of Reger[12], named from its occurrence in Monroe County near Reynolds School, is a shaly, blue to yellowish-blue limestone, 15 to 40 feet thick in Greenbrier County. It is very fossiliferous and lists of fossils identified in collections from this horizon are published in Chapter XIV. Its thickness, character, and stratigraphic position are shown in the Alta, Blue Sulphur Springs, Alderson, Butler Mountain, Briery Knob, Renick, Hawver School—East and Hawver School—West Sections, published in Chapter V. Due to the usual proximity of the outcrop of the Reynolds Limestone to that of the very pure limestones of the Greenbrier Series, it is of little economic value, although locally it may furnish a small amount of road material or agricultural lime.

Between the limestone just described and the underlying Webster Springs Sandstone, occurs a shale as shown in the General Section, which may be the equivalent of the Bickett Shale of Reger[13].

WEBSTER SPRINGS SANDSTONE.

The **Webster Springs Sandstone** of Reger[14] is represented in Greenbrier County by 10 to 50 feet of shaly, grayish-brown sandstone. Its character, thickness, and stratigraphic position are shown in the Cold Knob—Hinkle Well, Renick, and Renick Valley Sections, as published in Chapter V.

GLENRAY LIMESTONE.

The **Glenray Limestone** of Reger[15] is represented in Greenbrier County by 10 to 60 feet of more or less impure limestone. It is usually a bluish-gray, siliceous, thick-bedded, very fossiliferous limestone, belonging 100 to 150 feet above the base of the Mauch Chunk Series. Its stratigraphic position is shown in the Alta, Alderson, Blaker Mills, Blue Sulphur Springs,

[12]Ibid., pp. 426-430.
[13]Ibid., pp. 430-431.
[14]Reger, David B., Webster County Report, W. Va. Geol. Sur., pp. 227-228; 1920.
[15]Reger, David B., Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 432-437, 1926.

Hawver School—East, Hawver School—West, Richlands—Two Miles North, and Renick Sections, as published in Chapter V.

A discussion of the commercial possibilities of the Glenray Limestone is published in Chapter XII and lists of fossils collected from this horizon are published in Chapter XIV.

LILLYDALE SHALE.

The **Lillydale Shale** of Reger[16] is represented in Greenbrier County by a dark to greenish-gray, concretionary, micaceous shale that is usually somewhat carbonaceous. This somewhat fossiliferous bed is believed to be the same as the "**Pencil Cave**" of the oil well drillers of central and northern West Virginia. Its thickness, character, and stratigraphic position are noted in the Alta, Alderson, Butler Mountain, Briery Knob, Renick, Renick Valley, Richlands—Two Miles North, Savannah School, and Unus Sections as published in Chapter V. Lists of fossils collected from this shale are published in Chapter XIV.

A shaly lenticular sandstone that may correspond to the **Edray Sandstone** of Reger[17], was noted in the Briery Knob, Renick, Richlands—Northwest, and Richlands—Two Miles North Sections, as published in Chapter V. In general it is a thin, poorly defined stratum in Greenbrier County.

ECONOMIC ASPECTS, MAUCH CHUNK SERIES.

From an economic standpoint the Mauch Chunk Series does not have much to offer which can be readily exploited. The coals are all too thin and impure for even local domestic use. So far as known it contains no precious ore or metals. The shales could be used for the manufacture of brick and tile, but owing to an almost universal occurrence of this material, the demand would be limited to local use. The limestone of this series is of little value except as a soil maker as compared to the underlying Greenbrier Series. The soil from this series seems best adapted for timber growth and grazing land. One sandstone, the Droop, offers a good prospect as a glass-sand.

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[16]Ibid., pp. 437-443.
[17]Ibid., pp. 443-445.

GREENBRIER SERIES.

GENERAL ACCOUNT AND SECTION, GREENBRIER SERIES.

The Greenbrier Series, comprising the middle portion of the Mississippian and coming directly under the Mauch Chunk Series and immediately over the Maccrady Series, is composed almost entirely of limestone rocks. The name was derived, apparently, from the Greenbrier River, along which its best and greatest exposures occur, but by whom the title was first applied is not known. It is possible the name "Maxville" of Andrews[18] is entitled to priority, but like many other instances, the term Greenbrier has become so fixed in the literature of this and adjoining States that it seems unwise to supplant it by the Ohio title. Furthermore this formation in the latter State represents only a small portion of the series at its type locality in West Virginia, and no definite correlation between the two has been made.

The base of this series in West Virginia has been quite definitely established as resting upon the Maccrady red and purple shales in the southern counties; and on the Pocono sandstones, which offer a still greater contrast, in northern West Virginia where the former shaly beds have disappeared.

The Greenbrier Series in the area under discussion has a thickness that varies from approximately 475 to 750 feet, with a rapid thinning to the northeastward. Its maximum thickness here offers a contrast to its much greater thickness in adjoining counties to the south where Reger[19] has been able to trace many of the minor subdivisions over considerable areas and has given them suitable titles. These subdivisions while somewhat attenuated have been recognized in Greenbrier County and will be retained, so far as applicable, in this report. The subdivisions have been based mainly on lithologic characteristics.

The following general section was prepared from several measured sections and local notes and indicates the character of the series in the area of this report:

[18] E. B. Andrews, Ohio Geol. Sur., Report Progress, 1869, pp. 80, 84; 1870.

[19] David B. Reger, Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 449-451; 1926.

General Section of the Greenbrier Series for Greenbrier County, West Virginia.

	Thickness. Feet.	Total. Feet.
Limestone, Alderson, dark-gray, sandy, with crystalline streaks; very hard, occasionally oolitic, with numerous fossils, bryozoa (Archimedes), brachiopods, crinoids, (especially Pterotocrinus), corals, and a few pelecypods	50 to 150	150
Shale, Greenville, brown to dark, fissile, calcareous, lenticular, with marine fossils; abundant Chonetes, fish tooth	40 to 0	150
Limestone, Union, gray to dark, weathering white, hard, shaly at top; oolitic in part; contains profuse marine fossils; Pentremites, Archimedes, gastropods, bryozoa	200 to 150	300
Limestone, Pickaway, dark, hard, brittle, with occasional red streaks, but with only sparing marine fossils	50 to 135	435
Limestone, Taggard, gray, oolitic, fossiliferous, associated with red shale	10 to 35	470
Limestone, Patton, somewhat shaly at top, but hard, pure, and weathering gray at base; usually contains 5 to 10 feet of light-gray oolite; marine fossils; occasional nodules of black chert	150 to 90	560
Limestone, Sinks Grove, blue, hard, siliceous, weathering yellow at top and gray at base; often contains nodules of black chert; also contains marine fossils, brachiopods, bryozoa, crinoids, and gastropods	40 to 90	650
Limestone, Hillsdale (St. Louis age as correlated in Kentucky), grayish-blue, hard, massive; profuse marine fossils including Lithostrotion canadense (basaltiforme), L. proliferum; contains nodules of gray and black chert	30 to 100	750
Maccrady Series	......	......

TOPOGRAPHIC EXPRESSION, GREENBRIER SERIES.

In Greenbrier County there is a large area in which the outcropping rocks are limestones of the Greenbrier Series. In much of this area, a typical "karst" topography has been developed that is characterized by the presence of numerous sink-holes, a relatively low relief, and the general absence of an interconnecting valley system. This relatively low relief developed on the rocks of the Greenbrier Series is believed to be due in part to the absence of valley cutting and in part to the development of an intermediate erosion surface. Most of the streams crossing the Greenbrier outcrop have estab-

lished subterranean courses, which accounts for the apparent absence of valley cutting in the area.

Where outliers of basal Mauch Chunk remain, the underlying limestones have been protected from chemical erosion and as a result these outliers are usually found capping a ridge or knob. The effect of Mauch Chunk outliers is well illustrated by Falling Spring Mountain and Weaver Knob.

AREAL EXTENT, GREENBRIER SERIES.

The areal extent of the Greenbrier Series in Greenbrier County can be seen at a glance on Figure 10, while Map II shows the outcrops in much greater detail. The entire thickness of the limestone rocks is exposed along U. S. Routes 219 and 60, where they may be studied in detail.

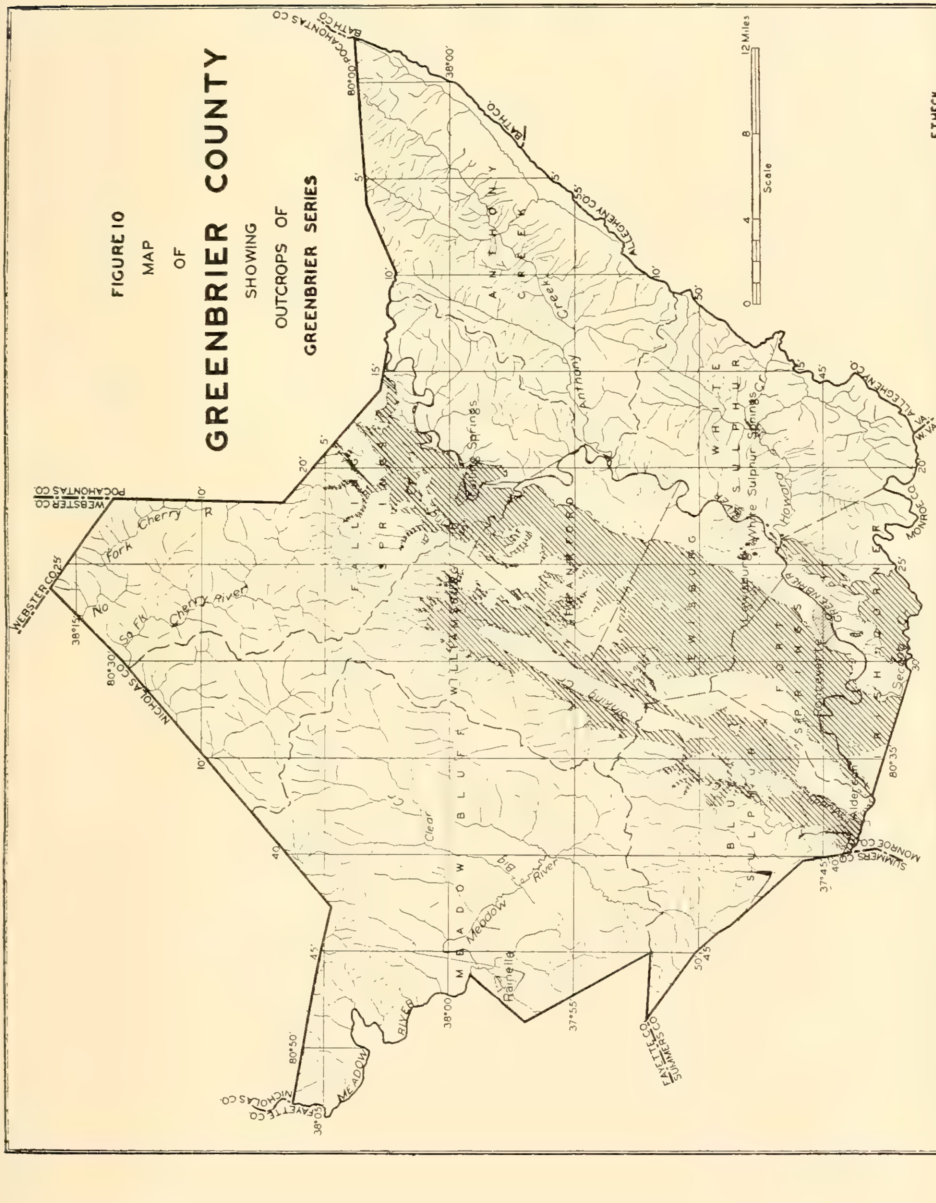
FIGURE 10
MAP
OF
GREENBRIER COUNTY
SHOWING
OUTCROPS OF
GREENBRIER SERIES
Scale
0 4 8 12 Miles
E.T. HECK

CONTACTS, GREENBRIER SERIES.

The contact of the Greenbrier and Mauch Chunk Series is conformable as discussed on a foregoing page under the description of the latter series.

At the base of the Greenbrier the contact with the Maccrady is much more marked and it is clear that an unconformity exists. Below the lowest massive limestone bed, there often occurs a calcareous shale that appears to be reworked Maccrady material. This shale may laterally grade into impure limestone that carries St. Louis fossils as described by the late Professor Tilton in Chapter XIV. Apparently there are no beds of Spergen (Salem) or Warsaw age in Greenbrier County.

FOSSIL LIFE, GREENBRIER SERIES.

In Greenbrier County this series is more or less fossiliferous throughout. A large number of collections were made and these have been identified by Professors Dana Wells and John L. Tilton. Lists of the fossils identified from each collection are published in Chapter XIV.

CORRELATION, GREENBRIER LIMESTONE.

The Greenbrier Series was mapped in this county using the same unit boundaries that were used in the Survey Report on Mercer, Monroe, and Summers Counties to the south and in the Pocahontas County Report to the north. As mapped the series starts at the top with the Alderson Limestone and extends down to, and includes, the lowest massive limestone bed of the Hillsdale member.

During the course of the field work a number of fossil collections were made with special reference to the Greenbrier-Maccrady contact. Subsequent to the completion of the field work on this part of Greenbrier County, detailed study of the fossils in these collections by the late Professor John L. Tilton indicates that 5 to 40 feet of calcareous shale that had been mapped as Maccrady belongs in the Greenbrier Series. The paleontologic evidence involved is presented in more detail in Chapter XIV. It is hardly necessary to point out that the inclusion of such a small thickness of beds in the Greenbrier Series does not materially affect the areal extent of the series as shown on Map II.

DESCRIPTION OF MEMBERS, GREENBRIER SERIES.

ALDERSON LIMESTONE.

The **Alderson Limestone** was named by Reger[20] from its occurrence in the vicinity of Alderson, Monroe County, where it is described as a dark-gray calcareous formation, weathering to an earthy yellow color, with a thickness which varies from 75 to 325 feet, and having an abundance of marine fossils. Attention is called to the variation in bedding at its type locality, there being some zones which are highly siliceous and which make a hard and durable limestone, and others which are fairly pure and crystalline, while still others are shaly and readily disintegrate. In Greenbrier County, somewhat the same character is retained except in a lesser degree. This member represents the succession of beds coming between the dark Lillydale Shale of the Mauch Chunk Series and the underlying Greenville Shale. In the general section at the beginning of this chapter it is shown as being dark-gray and sandy, with crystalline streaks, very hard, and containing numerous marine fossils, the most conspicuous of which are **Pentremites** which weather out in great abundance and which are locally called "petrified hickory nuts."

The thickness, character, and stratigraphic position of the Alderson Limestone are shown in the Alta, Alum Run, Acme Limestone Quarry, Alderson, Blaker Mills, Butler Mountain, Briery Knob, Hawver School—East, Renick, Renick Valley, Richlands—Northwest, Savannah School, and Unus Sections, published in Chapter V. Lists of fossils collected from this member are published in Chapter XIV and the use of this member as a quarry rock is discussed in Chapter XII.

GREENVILLE SHALE.

The **Greenville Shale,** named by Reger[21] from its occurrence near Greenville, Monroe County, where it is a black, fissile, and carbonaceous deposit, belonging, when present, between the Alderson and Union Limestones, and being quite lenticular and containing marine fossils, is present in Green-

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[20]David B. Reger, Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 462-466; 1926.

[21]Ibid., pp. 466-7.

brier County. This shale is brown to dark green, fissile, and calcareous, containing numerous marine fossils, and an occasional shark tooth. Its thickness, character, and stratigraphic position are shown in the Acme Limestone Quarry, Alta, Briery Knob, and Richlands—Northwest Sections. Fossils collected from this horizon are listed in Chapter XIV.

UNION LIMESTONE.

The **Union Limestone,** belonging just under the Greenville Shale, is probably the most important and persistent member of the Greenbrier Series in Greenbrier County. It was named by Reger[22] from its occurrence at Union, Monroe County, where it is a gray, hard limestone weathering white, and being often crystalline, usually pure, frequently having an oolitic structure and containing numerous marine fossils, its thickness varying from 100 to 275 feet. In Greenbrier County the same general character is retained, its nature being that of a gray to dark, hard limestone, which weathers white, is shaly at the top, and usually oolitic. Marine fossils are scattered throughout but so retained in the matrix that collections are not readily made.

The thickness, character, and stratigraphic position of the Union Limestone are shown in the Acme Limestone Quarry, Alta, Butler Mountain, Renick, Renick Valley, Richlands—Northwest, and Julia Post-Office Sections, as published in Chapter V and lists of fossils collected from this member are published in Chapter XIV. This member is a source of lime for chemical use, agricultural lime, and road material and its use for these purposes will be discussed in Chapter XII.

PICKAWAY LIMESTONE.

The **Pickaway Limestone,** named by Reger[23] from its occurrence in Monroe County, near Pickaway, and described as a very dark, hard, and sandy deposit immediately below the Union Limestone, varying in thickness from 175 to 400 feet, is present in Greenbrier County. It is usually blue to yellow in color, shaly at the top and massive at the base. Occasionally

[22] Ibid., pp. 467-472.
[23] Ibid., pp. 473-476.

PLATE XVIII.—Cross-bedding in the Webster Springs Sandstone (Mauch Chunk) one mile southwest of Modoc P. O., on Falling Spring Mountain.

PLATE XIX.—Greenbrier Limestone topography near Lewisburg. Mauch Chunk hills in background.

PLATE XX.—Stylolites in basal Greenbrier Limestone along Midland Trail (U. S. Route 60) west of Lewisburg.

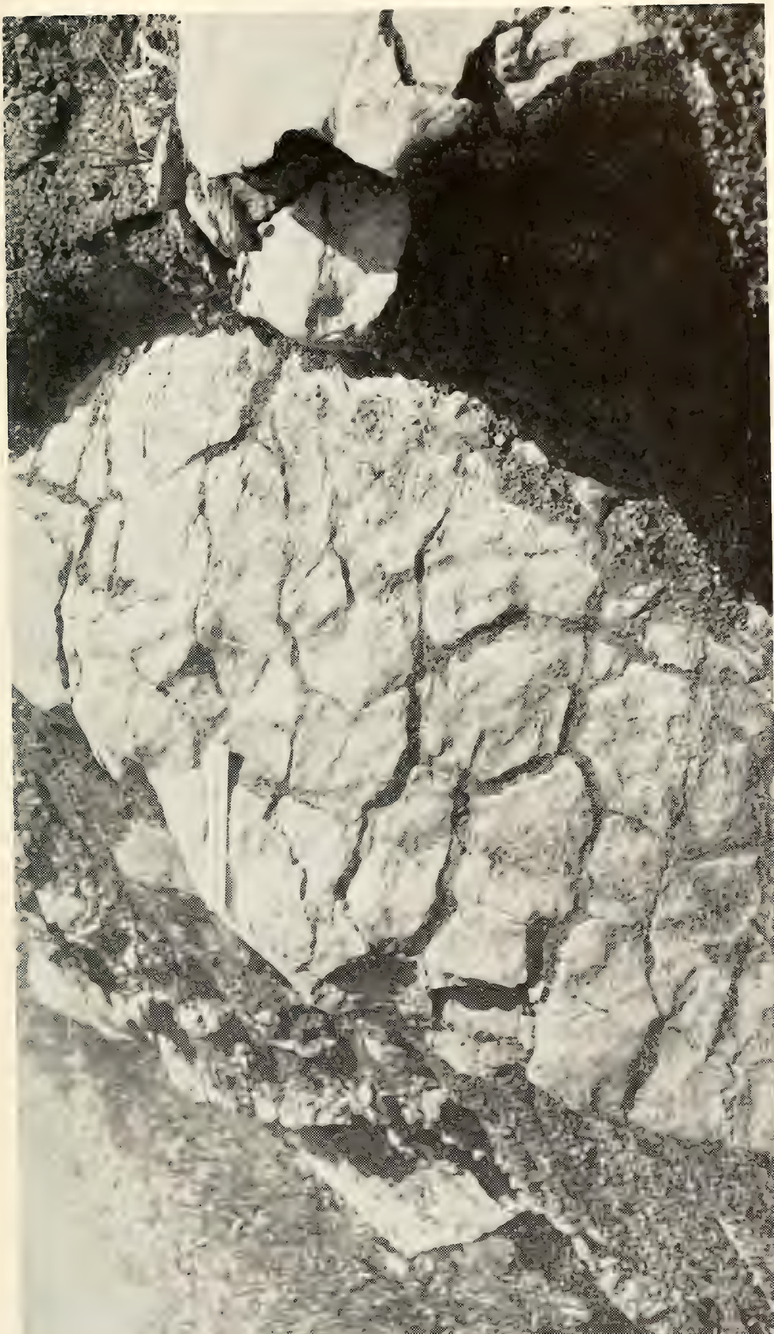

PLATE XXI.—Mud cracks in Taggard Limestone along Midland Trail (U. S. Route 60) one mile west of Alta.

PLATE XXII.—Greenbrier Limestone stripped of cover for quarrying at the Acme Limestone Company Quarry near Fort Spring. Note typical Pickaway joints.

PLATE XXIII.—Typical joints in Pickaway Limestone near Union, Monroe County. Cross-section view of bed

PLATE XXIV.—Typical joints in Pickaway Limestone near Union, Monroe County. Top of bed shown.

PLATE XXV.—Typical joints in Pickaway Limestone near Union, Monroe County.

chert nodules were noted in the lower part of this member. Its thickness, character, and stratigraphic position are shown in the Acme Limestone Quarry, Alta, Julia Post-Office, and Renick Sections as published in Chapter V and lists of fossils collected from this horizon are published in Chapter XIV. Its economic possibilities will be considered in Chapter XII.

Within the Pickaway member there is one ledge, near the top, that is characteristically jointed[24] normal to the bedding-plane. The thickness of the ledge affected by the joints is usually between 3 and 8 feet but at the Acme Limestone Quarry the jointed ledge was observed to be 15 feet thick (Plate XXII). No similar joints were found in beds above or below this particular ledge. The following special section shows the succession of beds above and below the jointed bed:

Renick Special Section.

Falling Springs District; begins 1 mile southwest of Renick P. O. and measured along the road to Spring Creek; arrangement in descending stratigraphic order.

			Thickness. Feet.	Total. Feet.
Greenbrier Series (125′+)				
Limestone, Union, oolitic, fossiliferous			10+	10
Limestone, yellowish-gray, weathers banded ribbon effect			15	25
Limestone, dark-gray, granular, calcite streaks, part oolitic, large fossils, lower part maroon and siliceous			30	55
Limestone, greenish-yellow, weathers white, argillaceous	10′	Pickaway		
Limestone, dark-blue, weathers yellow, characteristic joints	5	Pickaway	50	105
Limestone, yellowish-blue to dark-blue, impure	35	Pickaway		
Limestone, red and greenish-yellow	3′	Taggard		
Limestone, greenish-blue	2	Taggard	20	125
Limestone, gray-blue, granular, siliceous, very hard	15	Taggard		
Concealed to creek			......	......

In many places the impure limestone, noted in the above section immediately over the jointed ledge, grades into a calcareous shale.

[24]The partings in this ledge lack many of the characteristics that are usually inferred by the use of the term joint. For the want of a better term, however, these partings are called joints in this report.

The joints are filled with an impure calcareous cement that disintegrates more easily than does the limestone proper and as a result, weathering gives the ledge a conspicuous and distinctive appearance (see Plates XXIII, XXIV, and XXV). The unweathered rock will break across the joints almost as easily as along them so that it was possible to chip away most of the rock on either side of one of the joints, leaving a piece of rock that was about 60 per cent. joint filling. Chemical tests show that the sample has the following composition:

		Per cent.
Silica (SiO_2)		37.85
Ferric Iron (Fe_2O_3)		5.98
Alumina (Al_2O_3)		14.70
Lime (CaO)	16.38	
Calcium Carbonate ($CaCO_3$)		29.23*
Magnesia (MgO)	2.82	
Magnesium Carbonate ($MgCO_3$)		5.89*
Potash (K_2O)		3.67
Soda (Na_2O)		0.86
Titanium Oxide (TiO_2)		0.81
Phosphoric Acid (P_2O_5)		1.01
		100.00

*Calculated from the oxides.

By comparing the above analysis with analyses of samples taken from the entire ledge (as published in Chapter XII), it is seen that the material filling the joints is largely clay and quartz minerals that were probably added after the bed was deposited. It is therefore believed that the joints or tension fractures were in existence prior to the deposition of the next younger bed and that these open joints were filled with mud and sand during the deposition of the younger bed. Such conditions would suggest drying or mud-cracking as the cause of the tension joints but the joints do not have the polygonal pattern characteristic of mud-cracks (compare Plate XXI with Plate XXIV).

Individual joints are rarely over 10 feet long and are neither perfectly straight nor exactly parallel. One of the remarkable things about these joints, however, is the constancy of their average direction over a distance of some 30 miles along their outcrop. Figure 11 shows a number of locations at which the direction of the Pickaway joints was measured and the following table gives the data for these localities:

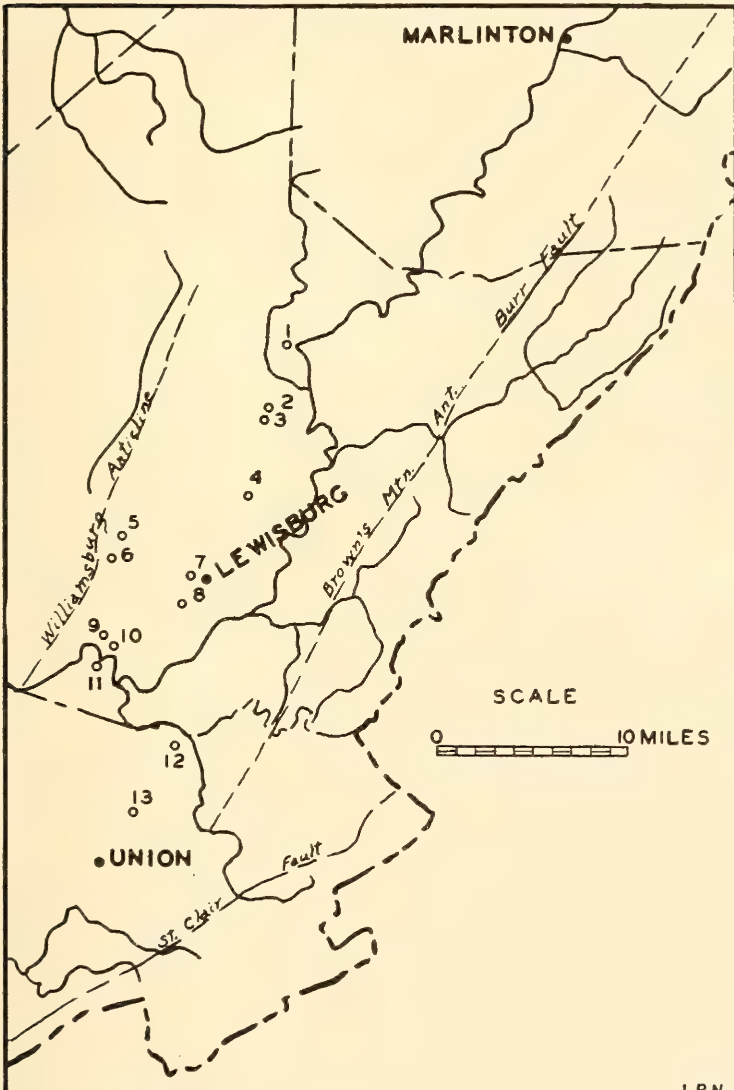

Figure 11.—Map showing localities where the direction of Pickaway joints was measured, and near-by major structural features.

Direction of Joints in the Pickaway Limestone.

Location Observed.	Direction.	Elevation.
Falling Springs District:		
1. Along U. S. Route 219, 1 mile southwest of Falling Springs (Renick P. O.)	N. 45° E.	1965′ B.
Frankford District:		
2. Along U. S. Route 219, 2 miles north of Frankford and 0.45 mile west of Walnut Grove Church	N. 46° E.	2215′ B.
3. Along U. S. Route 219, 1.1 miles north of Frankford and 1.25 miles west of Gilboa School	N. 45° E.	2290′ B.
Lewisburg District:		
4. Along public road, 0.65 mile southwest of Maxwelton and 0.7 mile east of Fairview School	N. 45° E.	2290′ B.
5. Along public road, 1 mile west of Central School and 1 mile northeast of Kramer School	N. 40° E.	1940′ B.
6. Along Lewisburg-Fort Springs District line, 1.2 miles west of George School	N. 40°–45° E.	2065′ B.
7. Along U. S. Route 60, 0.65 mile northwest of city limits of Lewisburg	N. 45°–50° E.	2140′ B.
Fort Springs District:		
8. Along public road, 0.5 mile northwest of Livesay School and 2 miles southwest of the city limits of Lewisburg	N. 38°–40° E.	2075′ B.
9. Along public road, 1 mile northeast of Curry School and 1.8 miles southwest of Livesay School	N. 40°–45° E.	2125′ B.
10. Along public road, 1 mile northwest of Fort Springs	N. 40° E.	1800′ B.
Irish Corner District:		
11. Near Acme Limestone Quarry, 0.6 mile west of Fort Springs	N. 40° E.	1675′ B.
Monroe County, Second Creek District:		
12. Along U. S. Route 219, 1.05 miles northwest of Second Creek (town) and 0.75 mile southwest of Second Creek (stream)	N. 44°–46° E.	1885′ B.
13. Along road 1 mile south of town of Pickaway, (type locality of Pickaway member)	N. 37°–42° E.	2215′ B.

There appears to be little or no connection between the Pickaway joints and the structural features developed during the Appalachian Revolution. As shown on Figure 11 and in more detail on Map II, the regional structural trend, in Greenbrier County, is north 25 to 30 degrees east, while the average strike of the joints is about north 40 to 45 degrees east. As mentioned above, the Pickaway joints are, so far as known, confined to a single ledge.

Regional isopach maps drawn by R. C. Tucker, on the Greenbrier Series, and on the Mauch Chunk Series show that the iso-thickness lines extend in the same direction as do the Pickaway joints. It is believed that these iso-thickness lines indicate the direction of the Mississippian shore-line and that there probably was some connection between the direction of the shore-line and the Pickaway joints.

A possible explanation of the Pickaway joints is that they represent tension fractures resulting from differential subsidence of the sedimentary basin of Greenbrier time and that their alignment was controlled by the direction of this differential subsidence. This condition may have been repeated several times but in the case of the Pickaway ledge, the newly deposited material was of just the right character to form open fractures and before these fractures were obliterated by wave action or the deposition of more lime, they were filled with argillaceous and arenaceous material.

Two more factors that may have played a part in the formation of these joints are as follows: (1) The subsidence may have been accompanied by earthquakes and after the stress was set up, the earthquakes may have started the fractures. (2) Once started the cracks may have been enlarged by drying as there are indications of shallow water conditions during deposition of this part of the Greenbrier Series.

TAGGARD LIMESTONE.

The **Taggard Limestone,** named by Reger[25] from its occurrence on Taggard Branch, Monroe County, is present in Greenbrier County and retains the same general character as noted at its type locality, except that it was not considered

[25]Reger, David B., Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 476-479; 1926.

advisable to separate it from its associated shales. In the Alta and Julia P. O. Sections, published in Chapter V, this limestone is recorded at 35 and 25 feet thick, yellowish-gray to red, shaly and somewhat oolitic. It is also shown in the Renick Special Section, page 273.

From an economic standpoint the Taggard Limestone is of minor importance, being too impure and shaly for most commercial uses.

PATTON LIMESTONE.

The **Patton Limestone**, named by Reger[26], from its occurrence near Patton, Monroe County, is represented in Greenbrier County by a hard, blue limestone, containing occasional nodules of black chert. It is somewhat shaly and sandy at the top and bottom but the middle portion is generally freer from impurities than most of the other members of the series. Its character, thickness, and stratigraphic position are shown in the General Section, on a preceding page of this chapter, and in the Alta, Julia P. O., and Patton Sections published in Chapter V.

The commercial possibilities of this bed are discussed and chemical analyses given in Chapter XII. Lists of fossils collected from this horizon are published in Chapter XIV.

SINKS GROVE LIMESTONE.

The **Sinks Grove Limestone**, coming just below the Patton Limestone, was first named by Reger[27] from its exposures in the vicinity of Sinks Grove, Monroe County. This same limestone is present in Greenbrier County although its development is much less prominent than that at its type locality. It is possible that the member was often mistaken for the overlying Patton Limestone or included with it, as at the majority of their exposures there is little evidence to distinguish them from one another. In general it is a massive, blue limestone, occasionally oolitic, and it may carry scattered nodules of black chert. Its thickness, character, and stratigraphic position are shown in the Alta, Julia P. O., and Patton Sections,

[26]Ibid., pp. 480-483.
[27]Ibid., pp. 484-487.

as published in Chapter V and its possible commercial uses are discussed in Chapter XII. Lists of fossils collected from this horizon are published in Chapter XIV.

HILLSDALE LIMESTONE.

The **Hillsdale Limestone** of Reger[28], named from its occurrence just east of Hillsdale, Monroe County, is represented in Greenbrier County by a grayish-blue to dark, hard, massive limestone that usually contains numerous nodules of black chert (Plate XXVI) which may weather to a gray color. It contains marine fossils that are scanty in the chert but they are abundant in the limestone matrix. In many places the Hillsdale contains many silicified fossil corals **(Lithostrotion canadense)** which are now scattered over the Maccrady outcrops where the limestone has been dissolved away.

The thickness, character, and stratigraphic position of the Hillsdale Limestone are shown in the Alta, Caldwell, Horseshoe Bend School, Julia P. O., Patton, and Spring Creek Sections as published in Chapter V. The commercial possibilities of the member are discussed in Chapter XII, and in Chapter XIV there is a rather full discussion of the fossils found in this bed.

ECONOMIC ASPECTS, GREENBRIER SERIES.

The best agricultural soil of the county is found along the outcrops of the Greenbrier Series, and as a result its entire exposures are cleared and cultivated. In this respect the limestone belts offer quite a contrast to the almost totally uncleared Pocono outcrops. In some localities, however, where the topography is too steep to retain a tillable soil, its use is limited to grazing but in regions where the surface is comparatively level, no better farming lands can be found anywhere.

The rock from this series is used as material for road macadam, railroad ballast, agricultural lime, and for chemical uses. In Chapter XII, under the subject of "Limestone," will be found a further discussion of these economic features.

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[28]Ibid., pp. 487-490.

MACCRADY SERIES.

GENERAL ACCOUNT, MACCRADY SERIES.

The Maccrady Series, comprising those beds between the Greenbrier Series and the Pocono Series, is a distinct and well-defined stratigraphic division in the area of this report. This assemblage of rocks was originally named by Campbell[29] the "Pulaski Shale" from its exposure in the county of that name in Virginia, but as this title had been earlier applied to an Ordovician formation in New York, Stose[30] gave it the name "Maccrady Formation" from its exposure in Smyth County, Virginia. Since it has been the policy of the West Virginia Survey to avoid as far as practicable the term "Formation" in the application of names to major subdivisions, Reger[31] has substituted the term Series for that of Formation, and the same usage will be followed in this report.

The Maccrady Series at its outcrops in Greenbrier County consists of deep-red shale and weakly bedded sandstone. Its thickness is quite variable, being thickest in the southeast part of its outcrop and thinnest in the north and northwest. It is estimated as 250 feet thick in the Caldwell Section and it appears to be about 60 feet thick near the Pocahontas County line. Other thicknesses between these extremes are shown in the Alta, Cold Knob—Hinkle Well, Horseshoe Bend School, Spring Creek—South, and Spring Creek—North Sections, as published in Chapter V.

TOPOGRAPHIC EXPRESSION, MACCRADY SERIES.

As with its stratigraphic position, the topography developed on the Maccrady outcrops is intermediate between that developed on the outcrops of the Greenbrier and on those of the Pocono, being more rugged than the former and less rugged than the latter. Being largely composed of shales that yield easily to weathering the Maccrady is usually marked by low smooth slopes.

[29]M. R. Campbell, Geol. Soc. Am., Bull., Vol. V, pp. 171, 178; 1894.

[30]G. W. Stose, Geology of the Salt and Gypsum Deposits of Southwestern Virginia, Bull. 530, U. S. Geol. Sur., pp. 232-255; 1913.

[31]David B. Reger, Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 492-493; 1926.

AREAL EXTENT, MACCRADY SERIES.

Figure 12, page 285, shows the outcrop of the Maccrady and Pocono Series and on Map II the extent of the Maccrady outcrop is shown in more detail and on a larger scale. The best development of this series in Greenbrier County is in the vicinity of Ronceverte and Caldwell.

CONTACTS, MACCRADY SERIES.

The upper contact of the Maccrady Series with that of the Greenbrier Series has been discussed on a preceding page under the discussion of the contacts of the latter series, where it was pointed out that a disconformity of considerable magnitude exists. The length of time represented by this disconformity can not be determined until the age of the Maccrady is finally settled.

The contact of the Maccrady and Pocono Series appears to be conformable in Greenbrier County although the change from massive sandstone to weakly bedded red shales is usually abrupt.

FOSSIL LIFE, MACCRADY SERIES.

The Maccrady Series is not fossiliferous in Greenbrier County. In adjoining areas and in Virginia it is reported that the upper part of the Maccrady is fossiliferous and the lower part non-fossiliferous, but Butts[32] has pointed out the desirability of separating these fossiliferous beds from the non-fossiliferous beds. In Greenbrier County, as discussed by Tilton in Chapter XIV, there are a few beds at the base of the Greenbrier Series that might be classified as Maccrady if one were to ignore the fossil evidence. The fact that these beds become more numerous and attain a greater total thickness toward the south is considered as added proof of the transgressive overlap of post-Maccrady beds.

CORRELATION, MACCRADY SERIES.

In view of the preceding comment, the proper correlation of the Maccrady Series with its equivalent in other States remains uncertain. Since the Maccrady as herein described

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[32]Butts, Chas., Oil and Gas Possibilities at Early Grove, Scott County, Virginia, Bull. 27, Va. Geol. Sur., pp. 3-8; 1927.

is not fossiliferous, its age can be determined only by determining the bed above and below it. As pointed out above, the series is marked by a disconformity at the top so that the age of the overlying beds serves only as the youngest limit of the age of the Maccrady. At its base the Maccrady appears to be conformable with the Pocono and some of the outcrops suggest that the relationship between the two series may be that of different conditions of sedimentation. In other words, beds that are Maccrady in one area might be the age equivalents of beds in other areas that are Pocono.

Stose[33], in the report where he first names the Maccrady, says that it probably represents the lower part of the Mauch Chunk of Pennsylvania, but this idea can not be accepted as the Mauch Chunk Series is now known to belong above the Greenbrier Series while the Maccrady belongs below.

ECONOMIC ASPECTS, MACCRADY SERIES.

In Greenbrier County, the Maccrady Series has been of value only as a maker of agricultural soils, for which purpose it is admirably adapted, since not only its shales but also its sandstones readily disintegrate. Along the Holston River near its type locality in Smyth County, Virginia, some of the soft beds of this series are saturated or wholly replaced by valuable deposits of gypsum and rock salt which are now being mined extensively as described by Stose[34]. There is no evidence that such deposits are present in Greenbrier County.

It is quite possible that some of the red and purple shales could be used for the manufacture of building brick or tile, since they are usually free from calcareous or organic matter and are quite plastic at some localities. Owing to their included iron they should burn to a rich red color.

[33]Stose, George W., Geology of the Salt and Gypsum Deposits of Southwestern Virginia, Bull. 530, U. S. Geol. Sur., p. 233; 1913.

[34]G. W. Stose, Geology of the Salt and Gypsum Deposits of Southwestern Virginia, Bull. 530, U. S. Geol. Survey, pp. 232-255; 1913: also see Gypsum Deposits of the United States, Bull. 697, U. S. Geol. Survey, pp. 283-298; 1920.

POCONO SERIES.

GENERAL ACCOUNT AND SECTION, POCONO SERIES.

The Pocono Series, belonging just beneath the Maccrady and above the Catskill, where the latter is present, is considered the basal major subdivision of the Mississippian in Greenbrier County as well as in all the counties of the State and in Maryland, Pennsylvania, and portions of other States farther west and south. The series was named by Lesley[35] in 1877, its previous designation having been the "Vespertine" or "No. X" of Rogers, both of which were gradually abandoned as lacking a geographic association. In 1877 also it was described as Pocono by Stevenson, Ashburner, and Platt in other publications in evident agreement with Lesley's nomenclature.

As exposed in Greenbrier County, the Pocono consists of coarse, reddish-brown, micaceous sandstone, often cross-bedded and conglomeratic, with brown, bluish-gray, and occasional red or green sandy shales, together with some impure and lenticular coals. Marine and plant fossils occur at various horizons throughout the series.

The following generalized section illustrates the occurrence of this series in Greenbrier County:

General Section of the Pocono Series for Greenbrier County.

	Thickness. Feet.	Total. Feet.
1. Sandstone, gray and brown, platy, alternating with gray and dark sandy shales	0 to 66	66
2. **Coal, Merrimac,** slaty, impure, lenticular, with plant fossils	0 to 4	70
3. **Sandstone, Broad Ford,** reddish-brown to gray, occasionally olive to green, ferruginous, usually thick-bedded, but often shaly, weathering to large concentric boulders; carries at least two zones of marine fossils	50 to 175	245
4. Shale and sandstone, gray, green, or brown, and flaggy sandstones, alternating with green, olive, blue, or red and carbonaceous shales; upper part may be **Broad Ford**	100 to 210	455
5. **Sandstone, Berea,** gray or brown, coarse to conglomeratic, usually massive but occasionally separated into olive and brown shale, and thin platy gray or brown micaceous sandstone	50 to 145	600

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[35]Lesley, J. P., Preface to Report HH, Sec. Geol. Survey of Pa. pp. XXIV-XXVI; 1877.

TOPOGRAPHIC EXPRESSION, POCONO SERIES.

Containing several resistant sandstones, the Pocono is now found capping many of the ridges in Greenbrier County. This series invariably produces a rough and rugged topography and such areas are generally uncleared, and are commonly referred to as "brush country." Along the eastern border of the county the basal Pocono sandstones are found capping much of Allegheny Mountain, Little Allegheny Ridge, and Meadow Creek Mountain. Just east of the Greenbrier River rocks of the same series are found capping White Rock Mountain, Kates Mountain, Greenbrier Mountain, and Peach Orchard Ridge. The Greenbrier River is entrenched in the Pocono rocks for much of its length in Greenbrier County.

AREAL EXTENT, POCONO SERIES.

On Figure 12 may be seen the general extent of Pocono and Maccrady rocks and on Map II the outcrop is outlined in much greater detail and on a larger scale.

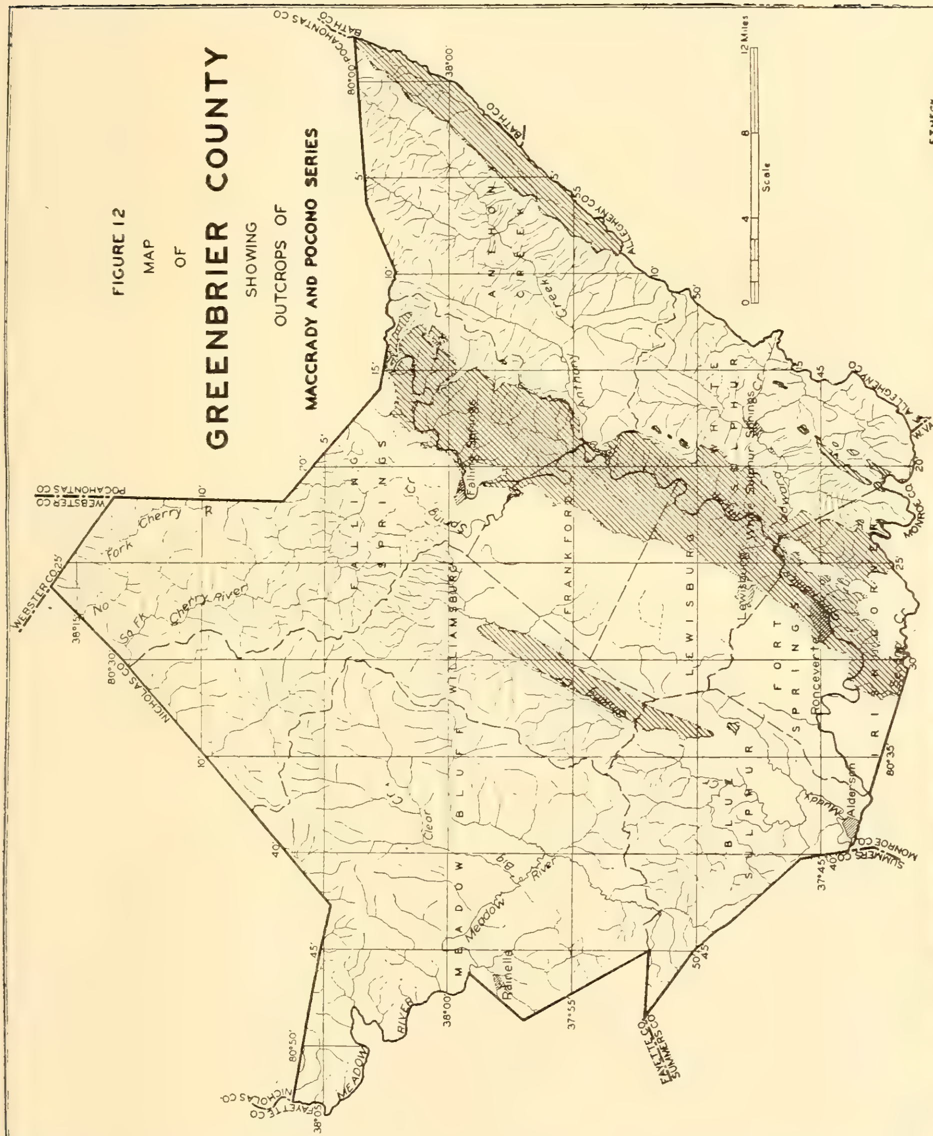
FIGURE 12
MAP
OF
GREENBRIER COUNTY
SHOWING
OUTCROPS OF
MACCRADY AND POCONO SERIES
WEBSTER CO.
POCAHONTAS CO.
NICHOLAS CO.
FAYETTE CO.
SUMMERS CO.
MONROE CO.
ALLEGHENY CO.
BATH CO.
W.VA.
FALLING SPRINGS
WILLIAMSBURG
FRANKFORD
LEWISBURG
MEADOW BLUFF
BLUE SULPHUR
FORT SPRINGS
WHITE SULPHUR
ANTHONY CREEK
IRISH CORNER
Falling Springs
Lewisburg
White Sulphur Springs
Ronceverte
Alderson
Rainelle
Cherry River
Meadow River
Scale
12 Miles

CONTACTS, POCONO SERIES.

The upper contact of the Pocono Series with the Maccrady Series was discussed on a preceding page in connection with the latter series, where it was pointed out that the contact appears to be conformable. The bottom contact of the Pocono is easily found in the northern part of the county where the red Catskill shales are present but its conformable or unconformable nature is not easily determined. In the southern part of the county the Pocono rests upon the Chemung, the Catskill being absent, and in many places the exact location of the contact is difficult to determine. If the Catskill is actually cut out by erosion, as conditions near Caldwell suggest, the contact is, of course, disconformable but such a relationship is not proved because the exact age of the conglomerates at Caldwell could not be definitely established despite the fact that many fossil collections were made.

FOSSIL LIFE, POCONO SERIES.

The following quotation from Reger[36] sets the stage for a discussion of both the fossil life and correlation of the Pocono:

"For nearly 100 years the rocks composing the Pocono Series, as now called, have been studied in Pennsylvania, Maryland, and the two Virginias and have been generally regarded as fresh-water deposits, although marine fossils have been observed at isolated localities where their occurrence has been looked upon as unusual and where little attempt has been made to trace them into adjacent territory. Dr. I. C. White and C. A. Ashburner recorded three occurrences in Bedford and Huntingdon Counties, Pennsylvania, in the Second Geological Survey of that State; but farther west in Fayette, Westmoreland, and Indiana Counties, Stevenson failed to see them, even describing some of the beds which now prove to be most interesting as 'Wholly characterless,' and most of the folios of the United States Geological Survey which covered the same ground many years later record no marine fossils, although Butts speaks of a Lingula and a fragment of a lamellibranch. In West Virginia a few isolated occurrences were noted by Prof. S. B. Brown, Dr. W. Armstrong Price, and the writer, a short paper having once been prepared for 'Science' by Dr. Price in which some of these exposures were noted and a few instances having been noted by him in the Tucker County Report of the West Virginia Survey. In general, however, the fossils have escaped attention throughout the State. In Virginia fossils have been found at a few points in the Price (Pocono) Formation, but apparently little attempt has been made to utilize them as correlation planes,

[36]Reger, David B., Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 508-510; 1926.

the statement being made in a quite recent report that no single sandstone bed, with the exception of the basal conglomerate, can be traced from place to place.

"After studying the Pocono Series in Mercer and Monroe Counties, West Virginia, and after following the outcrop from its type locality in the Pocono Mountains of Monroe County, Pennsylvania, southwestward across Pennsylvania, Maryland, West Virginia, Virginia, Kentucky, and Tennessee, the writer has found, much to his own confusion as well as to that of his predecessors, that abundant marine fossils exist in various zones of the series all the way from the Broad Top Coal Field of Huntingdon and Bedford Counties, Pennsylvania, westward into Blair, Westmoreland, Fayette, and other counties that border the eastern rim of the Appalachian basin and southward and southwestward across West Virginia by way of Preston, Tucker, Pocahontas, Greenbrier, Monroe, and Mercer Counties, to the Virginia State line. In the latter State they may also be followed from the coal fields of Montgomery County southwestward into Tennessee through the medium of the Price and Grainger beds and westward into Kentucky where part of the series is known as New Providence and where its fossils have had careful study.

"Such parts of the above study as properly pertain to Mercer and Monroe Counties, West Virginia, will be detailed under the 'Description of Members' on later pages of this Report but the more extensive studies will be reserved for a subsequent volume on the Mississippian.

"Before passing from the subject, however, it is well to note that some of the species found in the lower portions of the Pocono are types which have been regarded as confined almost exclusively to the Chemung Series of the Devonian, so that Dr. Girty has not accepted them as belonging to the Mississippian Period. His viewpoint on some of these collections is quite natural since in many instances he did not see the localities in the field and had no evidence except that of the fossils themselves. In central and northern West Virginia, as well as throughout Pennsylvania, the distinctly red shales of the Catskill Series, varying from a few hundred to several thousand feet in thickness and always being easily recognized, intervene between the Chemung and Pocono, affording a lithologic sequence that can not be disregarded, so that the Pocono Series with its well-known Mississippian flora and its occasional beds of coal can always be identified. Under such conditions the presence of a fauna with certain Chemung aspects in the Pocono must be considered only as a recurrence of these species in younger strata. Such a recurrence need not be surprising, however, since the fauna of the Pocono, as already explained, has had only fragmentary study, and it would appear necessary to abandon the idea that certain types, including **Spirifer disjunctus**, perished before the close of the Devonian."

As indicated in the above quotation, the fossil life of the Pocono has not received the study it deserves in West Virginia and in the surrounding States. Chadwick[37] has recently pub-

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[37]Chadwick, George Halcott, The Great Catskill Delta, The Pan-Amer. Geol., Vol. LX, No. 2; 1933: What is Pocono?, Amer. Jour. Sci., 5 ser., Vol. 29, No. 170, pp. 133-143; 1935: Faunal Differentiation in the Upper Devonian, G. S. A. Bull., Vol. 46, No. 2, pp. 305-342; 1935.

lished several papers that are in part or entirely on the Pocono of northern Pennsylvania. The sum total of his work, however, is that in that area the age of the "Pocono" not only varies but it is of Devonian age. Based on fossil plant evidence, David White[38] considers the Pocono to be Mississippian all the way from "East Mauch Chunk, on the slope of the Pocono Mountains, (in Pennsylvania) southward along the east side of the Appalachian Trough as far as Tennessee . . ." Although Chadwick[39] says that he accepts White's thesis without question, save the use of the name Pocono, he implies that White should check the geologic range of his fossils. In the same paper Chadwick[40] also points out that I. C. White[41] reports that there is no Pocono in Pocono Mountain or in Pocono Township or in fact in the whole Pocono plateau, except topping a few peaks and that the thesis and map of Norman Spenser Wagner[42] fully confirms I. C. White's discovery that the "Pocono" does not exist on the Pocono plateau. In the same paper Chadwick also states that in Fayette County, Pennsylvania, the Pocono beds are Canadaway. David White[43] states that Reger[44] and Girty[45] have proved the Mississippian age of the Pocono in the Broadtop basin, Pa., but Chadwick[46] says that his "reading of Doctor Girty's interpretations has not been so unqualified." Along the same line it is interesting to note that Reger[47] reports:

"In this connection, however, it is well to remark that in northern West Virginia and on the Youghiogheny and Conemaugh Rivers of Pennsylvania where the Broad Ford Sandstone becomes quite shaly, the faunas of this and other members of the lower part of the Pocono

[38]White, David, The Age of the Pocono, Amer. Jour. Sci., 5 ser., Vol. 27, No. 160, pp. 265-272; 1934; see also a discussion of Mississippian plants by White in the Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., pp. 837-843; 1926.

[39]Chadwick, George Halcott, What is Pocono?, ibid., see especially the foot-note, p. 133.

[40]Ibid., see p. 142.

[41]White, I. C., 2nd Geol. Sur. Pa., G6, pp. 89-90; 1882.

[42]See Chadwick's foot-note, ibid., p. 143.

[43]Reference, foot-note 38, p. 270.

[44]Reger, David B., Pocono Stratigraphy in the Broadtop basin of Pennsylvania; Bull. G. S. A., Vol., 38, pp. 397-410; 1927.

[45]Girty, G. H., Pocono fauna of the Broadtop coal field, Pa., U. S. Geol. Sur., Prof. Paper 150E, p. 127; 1928.

[46]Ibid., p. 141.

[47]Reger, David B., Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., p. 525; 1926.

PLATE XXVI.—Chert nodules weathered in relief in Hillsdale Limestone on Mill Creek, 1.6 miles south of Asbury

PLATE XXVII.—Quarrying road material from the Broad Ford Sandstone in a road cut east of Caldwell.

PLATE XXVIII.– Broad Ford Sandstone in C. & O. Railroad cut at Caldwell.

PLATE XXIX.—Basal Pocono sandstone conglomerate (Berea?) along Midland Trail (U. S. Route 60) 0.9 mile east of Caldwell.

assume certain aspects which Dr. Girty considers to be of a Devonian character, based on his study of the collections made by the writer (Reger) at these localities."

In Pocahontas County, Paul H. Price has made a number of collections of fossils from the Pocono and as reported by him[48], these fossils were identified by Dr. John L. Tilton, who considered them to be Mississippian. In his discussion of some of the fossils, Tilton remarks on the "wonderfully Chemung-like fossil assemblages."

Several collections of Pocono fossils were made in Greenbrier County in connection with the field work for this report and the fossils identified are listed in Chapter XIV. Although the fossils collected in Greenbrier County were not perfect nor complete specimens, they would have been unquestionably identified as Mississippian forms, if the Mississippian age of the entire Pocono Series had not been in doubt.

As reported by Reger[49], a collection of Pocono plants was made by Reger, Price, and Dr. David White, 2.2 miles southwest of the highway bridge across the Greenbrier River at Ronceverte, on the south side of the river, at an elevation of 1800′ B. The collection was turned over to Dr. White and so far as known to the writers, no identifications of the fossils in the collection have been made.

CORRELATION, POCONO SERIES.

The Pocono Series as defined in Greenbrier County is plainly of the same general age as the beds described under the same series in other counties of West Virginia as well as the adjoining States of Maryland and Pennsylvania on the north, even though considerable change in conditions of deposition has taken place. Beds of the same apparent age, however, in southwestern Virginia and northeastern Tennessee have been described under such titles as Price Formation and Grainger. Reger[50] is of the opinion that the New Providence Group of Kentucky is of the same age as the Pocono, which was earlier pointed out by Butts in a discussion of the Mississippian Series of eastern Kentucky.

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[48]Price, Paul H., Pocahontas Report, W. Va. Geol. Sur., pp. 379-383; 1929.

[49]Reger, David B., Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., p. 511; 1926.

[50]Ibid., p. 512.

DESCRIPTION OF MEMBERS, POCONO SERIES.

In some parts of Greenbrier County a lenticular sandstone is present immediately below the red Maccrady shales, that is regarded as marking the upper boundary of the Pocono Series. This sandstone is usually gray or brown in color, platy, and shaly, ranging in thickness from 0 to 66 feet as shown in the generalized section published on a preceding page.

MERRIMAC COAL.

In Greenbrier County, a lenticular coal was noted in the upper part of the Pocono that is believed to correlate with the **Merrimac** or "**Big Seam**" of Montgomery County, Virginia, where it has been mined on a commercial scale for several years. A great deal of time, energy, and money has been spent in prospecting this coal in Greenbrier County, with but little success. Although the occurrence of the seam is of great scientific interest, it does not appear to attain sufficient thickness, regularity, and purity in Greenbrier County to be of commercial value and further prospecting of this horizon should be discouraged.

Near Hokes Mill in southern Greenbrier County and adjoining parts of Monroe County, several coal test borings were drilled to test this coal and the results were very disappointing. The records of these borings (Nos. 16, 17, 18, and 19) are published in Chapter XI. The correlations shown in the records of these borings were determined by Mr. David B. Reger and it is noted that he recognized several beds such as "Squaw Sandstone," "Lindside Sandstone," and "Langhorne Coal." Since no method has been found for definitely identifying these beds on the surface in Greenbrier County, the correlations of these beds are not carried into the other parts of the county.

The following exposures of Merrimac Coal were noted in Greenbrier County:

Coal Exposure—No. 503 on Map II.

On west side of public road, 0.8 mile north of Hokes Mill; **Merrimac Coal; elevation, 1640' B.**

	Ft.	In.
Coal	1	6

Reger[51] collected a sample (No. 636R) of coal near the above exposure and its chemical analysis is published under **No. 503** in the Table of Coal Analyses at the end of Chapter XI.

W. A. Napier Mine No. 1 (Abandoned)—No. 504 on Map II.

On west side of Greenbrier River, 2 miles north of Caldwell and 0.3 mile northeast of Coalbank School; **Merrimac Coal**; elevation, 1860′ B.

	Ft.	In.
1. Sandstone, gray to brown, hard, micaceous, 10′ to	15	0
2. **Coal**, impure, lenticular, 0′ to	4	0
3. Sandstone, shaly	5	0

A sample (No. 77PH) was taken from No. 2 of the above section and its chemical analysis is published under **No. 504** in the Table of Coal Analyses at the end of Chapter XI. The above mine was operated for a time in 1928 and an estimated 150 tons of coal was removed.

Coal Exposure—No. 505 on Map II.

Along public road, 1.3 miles northeast of Julia and 0.7 mile northwest of Rorer; **Merrimac Coal**; elevation, 2250′ B.

	Ft.	In.
Coal blossom	1	6

Coal Exposure—No. 506 on Map II.

Along public road, 0.85 mile northeast of Rorer; **Merrimac Coal**; elevation, 2470′ B.

	Ft.	In.
Coal blossom, thickness not determined	......	....

Coal Prospect—No. 507 on Map II.

On west side of Greenbrier River, 0.95 mile east of Alum Springs and 0.7 mile west of Judyton, P. O., (Keister Sta.); **Merrimac Coal**; elevation, 2085′ B.

	Ft.	In.
1. Sandstone, cross-bedded, lenticular, with plant fossils and **coal** streaks	10	0
2. **Coal**, irregular, impure, 6 inches to	1	6
3. Shale, black, carbonaceous, fissile, thin-bedded, with plant fossils	10	0

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[51]Reger, David B., Mercer, Monroe, and Summers Report, W. Va. Geol. Sur., p. 516; 1926.

A sample (No. 98PH) was collected from No. 2 of the above section and its chemical analysis is published under **No. 507** in the Table of Coal Analyses at the end of Chapter XI.

Floyd Childers Coal Prospect—No. 508 on Map II.

Monroe County; near Greenbrier County line, 1.55 miles southeast of Salem Church; land formerly known as "Williams Place"; A. Bell Hoke owns mineral rights; **Merrimac Coal**; elevation, 2350' B.

	Ft.	In.
Coal, fallen shut, thickness reported	1	6

A sample (No. 102PH) was collected from the dump of the above prospect and its chemical analysis is published under **No. 508** in the Table of Coal Analyses at the end of Chapter XI.

A study of the analyses of the Merrimac Coal as published in the Table of Coal Analyses at the end of Chapter XI, together with the detailed exposures and prospects herein exhibited, indicates that little hope of finding valuable coal in this horizon can be entertained in Greenbrier County. The coal is so irregular in occurrence, so impure and thin, and so disturbed by folding that it could hardly be seriously considered as a commercial deposit and it is quite doubtful whether attempts to use it for local domestic purposes will ever be successful.

BROAD FORD SANDSTONE.

The **Broad Ford Sandstone**, coming near the top of the Pocono, is one of the prominent members of this series in Greenbrier County and is well exposed for many miles along the Greenbrier River. The lateral streams that flow into the main river have cut deep V-shaped valleys through the Pocono Series and now offer many excellent exposures of the Broad Ford member. This sandstone was named by Reger[52] from its exposure near the village of Broad Ford at the line between Smyth and Tazewell Counties, Virginia.

In Greenbrier County this division of the Pocono Series is largely a sandy deposit, being massive in the upper part, but often split into benches, with the lower part becoming quite shaly. It is generally reddish-brown to gray, micaceous

[52] Ibid., pp. 520-525.

feruginous, and has an upper bench which weathers into large concentric boulders, a characteristic that is traceable across southern West Virginia. It usually contains several zones of marine fossils, but in the localities where collections were made the fossils were so badly weathered that complete identifications were not possible. The Broad Ford, as well as the greater part of the Pocono Series, decreases in thickness to the northwest, and hence has its best development in the central and southern portions of the county. Along the Chesapeake and Ohio Railway, near the Greenbrier-Pocahontas County line, this sandstone is quite massive and forms steep precipitous cliffs west of the Greenbrier River. Its thickness, character, and stratigraphic position are shown in the Caldwell, Cold Knob—Hinkle Well, Spring Creek—North, and Spring—South Sections as published in Chapter V.

Certain portions of the Board Ford Sandstone are suitable for building material and have been used for that purpose at several points in the county. The stone used in the construction of many of the Chesapeake and Ohio Railway bridges was quarried from this stratum.

In the general section which appears earlier in this chapter, a stage of variegated shales and flaggy sandstones is noted coming between the Broad Ford and Berea Sandstones. It is possible that this succession of beds should be included in the Broad Ford Sandstone. If this were done, however, some more inclusive term, such as Formation, would be necessary to properly designate it.

BEREA SANDSTONE.

In Greenbrier County, as in the counties to the north and south, the base of the Pocono Series is marked by a medium- to coarse-grained sandstone that is usually conglomeratic. This stratum has been termed the **Berea Sandstone** in the reports on adjoining counties, and that name is retained in this report.

The **Berea Sandstone** or **Berea Grit** was first named by Newberry[53] from its occurrence near the town of Berea in northeastern Ohio, where it has been quarried extensively. The Mississippian age of the Berea in Ohio has not been ques-

[53]Newberry, John S., Report of Progress in 1869, pt. 1, pp. 21, 22 and 29, Ohio Geol. Sur.; 1870.

tioned and if the Pocono of southeastern West Virginia is Mississippian it is quite probable that its basal sandstone does correlate with the Berea of Ohio.

The character, thickness, and stratigraphic position of the Berea Sandstone are shown in the Caldwell Section, published in Chapter V, in the generalized section in this Chapter, and its appearance is well illustrated on Plates XXIX, XXX, and XXXI.

ECONOMIC ASPECTS, POCONO SERIES.

From an economic standpoint the Pocono Series is of minor importance, there being no coals of minable thickness, and the sandstones producing a soil that is better fitted for timber growth than for cultivation. As noted under the description of that member, the Broad Ford Sandstone is, in some localities, suitable for heavy masonry and has been used locally for that purpose. The shales are generally too sandy for brick or tile manufacture. Farther west in the State this series often holds large quantities of both oil and gas, the character of these strata being such as to make excellent reservoirs for their retention. In this county, however, there is little hope of finding either oil or gas in these rocks, as any of the lighter hydrocarbons that may have once existed in them has been permitted to escape, on account of their frequent exposure above drainage. A further discussion of oil and gas possibilities will be found in Chapter X.

CHAPTER VIII.

STRATIGRAPHY—DEVONIAN ROCKS.

GENERAL STATEMENT.

The rocks comprising the Devonian Period in Greenbrier County retain, in general, the same characteristics as found in New York and other northern Appalachian States, so that the generally accepted standard column of New York will be followed in this report. It is true that certain minor subdivisions have disappeared, while other members have considerably decreased in thickness, but at the same time the general group relationship is evident throughout. In a recent paper, Chadwick[1] has proposed a new system of classification of the Devonian rocks in New York and Pennsylvania and offers a revision of the range of the various fossils. The field work and mapping were finished in Greenbrier County before the appearance of Chadwick's paper. As a result the older classification of Devonian rocks is followed in this report without either rejecting or accepting Chadwick's classification. The Devonian of Greenbrier County has the following succession in descending order:

Upper Devonian: (Hampshire and Jennings of U. S. Geological Survey publications).
- **Catskill Series (0-400′).**
- **Chemung Series (2000-3000′).**
  - Hendricks Sandstone.
  - Shales and sandstones.
- **Portage Series (2000′±).**
  - Shales, with thin sandstones.
- **Genesee Series (50-100′).**
  - Shale.

Middle Devonian: (Romney of U. S. Geological Survey publications).
- **Hamilton and Marcellus Series (500′±).**
  - Shales, with thin limestones.

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[1]Chadwick, George Halcott, Faunal Differentiation in the Upper Devonian, G. S. A. Bull., Vol. 46, No. 2, pp. 305-342; 1935.

Lower Devonian:
Oriskany Series (80-90′).
Huntersville Chert.
Ridgeley Sandstone.
Helderberg Series (300′±).
Becraft.
New Scotland.
Coeymans (?).
Keyser.

Further comment on the nomenclature of this period will follow on succeeding pages under the description of the various subdivisions.

The Devonian of Greenbrier County will average approximately 6,500 feet in thickness, and comprises almost half of the outcropping rock column. Its outcrop is limited to the eastern side of the county and almost entirely to the territory east of the Greenbrier River, the only exception being the Catskill which outcrops along this stream and occasionally west of it. Good exposures are usually available for most portions of the section although much difficulty is encountered in measuring these beds as complete units at continuous exposures, because of the frequent folding and duplication of beds. Along Mays Draft, some 4.5 miles north of White Sulphur Springs, a total of 6,000 feet of Devonian rocks was measured starting at the base of the Pocono and extending down to the base of the Marcellus Series. The thickness was measured by steel tape, using a Brunton clinometer, and corrections were made for the dip of the rocks. Ten dip readings were taken along the line of traverse, the rocks dipping to the northwest at an inclination of 20 to 50 degrees from the horizontal.

UPPER DEVONIAN ROCKS.

CATSKILL SERIES.

GENERAL ACCOUNT, CATSKILL SERIES.

The Catskill Series coming at the top of the Devonian and just beneath the Pocono Series, is composed of red shales interbedded with massive green or brown sandstones with occasional green and brown shales. The sandstones are very conglomeratic in some localities and east of Anthony Creek,

two massive conglomerates, each 30 to 40 feet thick, were noted in this series. The series reaches a maximum thickness of 400 feet near the Greenbrier-Pocahontas County line and thins away to zero thickness on Greenbrier Mountain. The Catskill was not noted along Howard Creek east of Caldwell, nor does it reappear south of this point.

Throughout most of their outcrop the shales and sandstones of the Catskill appear to be lenticular, changing from one to the other within narrow limits, so that definite correlation of individual beds for any distance is quite impracticable.

TOPOGRAPHIC EXPRESSION, CATSKILL SERIES.

In Greenbrier County there are several resistant sandstones in the Catskill Series and as a result the topographic expression of this series is very much like that developed on the overlying Pocono and underlying Chemung rocks. The Catskill rocks aid in forming Little Allegheny Ridge and Meadow Creek Mountain.

AREAL EXTENT, CATSKILL SERIES.

In areal extent the Catskill Series presents a narrow outcrop along and just east of the Greenbrier River, extending from the Pocahontas line southwestward to Greenbrier Mountain. The Catskill is present in only one other area, that being a narrow outcrop on Little Allegheny Ridge and Meadow Creek Mountain in the northeastern part of the county. The outcrop of this series is delineated on Map II and the areal extent together with that of the other Upper and Middle Devonian rocks is shown on Figure 13.

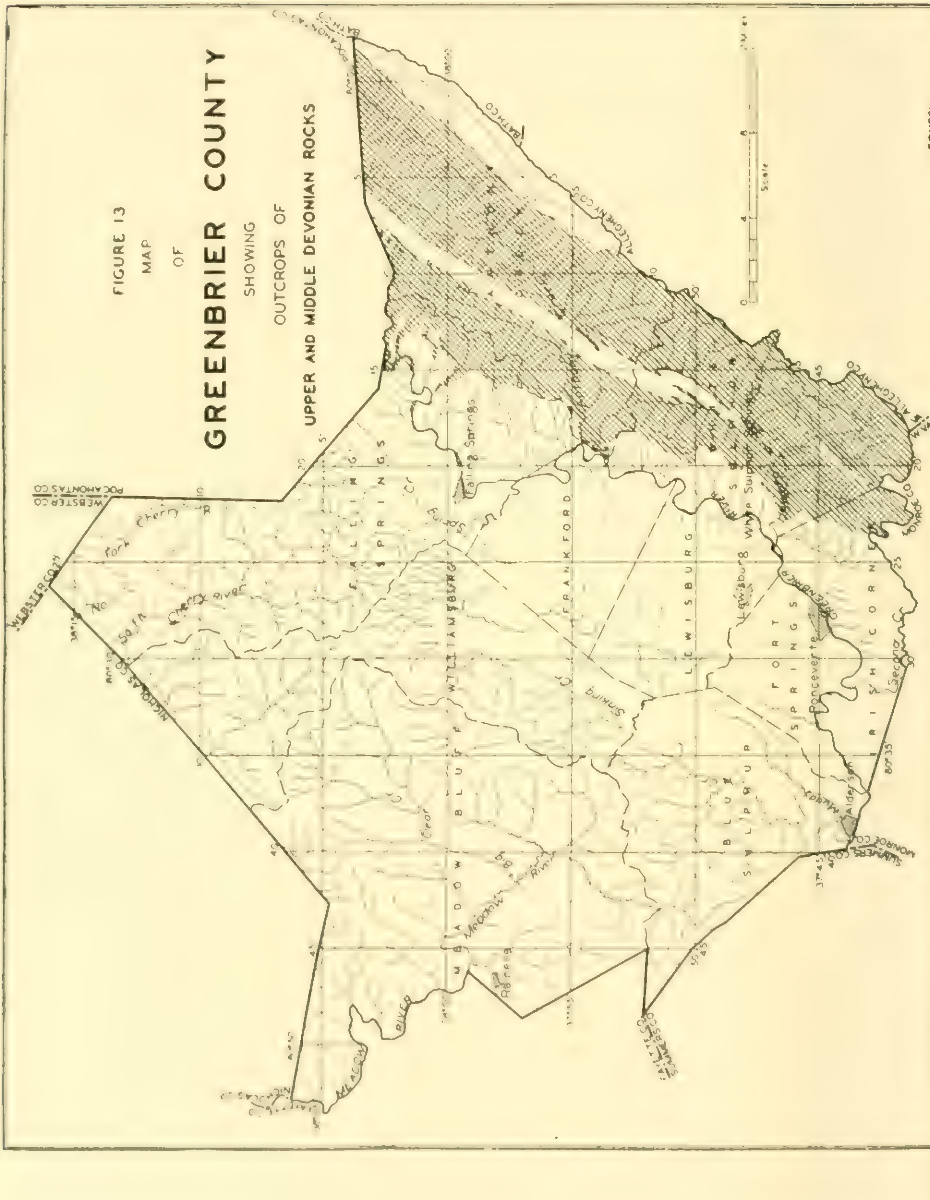
FIGURE 13
MAP
OF
GREENBRIER COUNTY
SHOWING
OUTCROPS OF
UPPER AND MIDDLE DEVONIAN ROCKS
FALLING SPRINGS
WILLIAMSBURG
FRANKFORD
LEWISBURG
FORT SPRINGS
IRISH CORNER
BLUE SULPHUR
MEADOW BLUFF
Falling Springs
Lewisburg
White Sulphur
Ronceverte
Alderson
Meadow
Big
River
Sinking
Spring
Clear
Cr
Cherry River
Fork Cherry
Second
WEBSTER CO
POCAHONTAS CO
NICHOLAS CO
BATH CO
ALLEGHENY CO
MONROE CO
SUMMERS CO
FAYETTE CO
GREENBRIER
Scale
F.T.HECK

CONTACTS, CATSKILL SERIES.

The contact of the Catskill Series with the overlying Pocono of the Mississippian has already been discussed under the description of the latter series, page 286. The contact at the base of this series where it rests on the Chemung has been the subject of much discussion. The generally accepted contact has been the dividing line between the red beds and the underlying green and brown fossiliferous sandstones and shales of the Chemung. At certain localities, however, red streaks are often found interlaminated with beds of Chemung character, while olive and green shales with typical Chemung fossils have been noted well up in the red shales. It is the opinion of some authorities and particularly paleontologists, that the contact should be placed at the last recurrence of fossils regardless of the presence of red shales. If this plan were followed the areal mapping of this contact in many counties would prove to be a hopeless task. Dr. I. C. White often expressed the opinion (oral expression) that the presence of marine fossils in the basal portion of the red beds was due to the local existence of lagoons where conditions remained favorable to marine life. It is now believed by some geologists that the typical non-marine Catskill sediments of the east are contemporaneous with at least a portion of the marine sediments of the Upper Devonian to the west. This interfingering effect of these marine and non-marine sediments is accounted for by a shifting strand line.

In Greenbrier County the bottom contact of the Catskill is placed at the top of a persistent, massive, often conglomeratic sandstone that occurs near the base of the typical red shales and near the top of those beds that are characteristic of the Chemung. This sandstone, which is correlated with the Hendricks Sandstone of Reger and Price[2], offers what is probably the most satisfactory boundary between these two series in Greenbrier County. Because this sandstone often contains fossils of Chemung age, it is placed in that series with the contact coming immediately above.

[2]Reger, David B., and Price, Wm. Armstrong, Tucker Report, W. Va. Geol. Survey., pp. 245-251; 1923.

FOSSIL LIFE, CATSKILL SERIES.

The typical Catskill of Greenbrier County appears to be devoid of fossil fauna and the fossil flora are rare and poorly preserved. No fossil collections were made from this series in this county.

CORRELATION, CATSKILL SERIES.

It is evident from the foregoing discussion that the Catskill Series as found in Greenbrier County correlates, at least in part, with this same series in the other counties of this State where it has often been designated as **Hampshire Formation** by members of the U. S. Geological Survey.

ECONOMIC ASPECTS, CATSKILL SERIES.

From an economic standpoint the Catskill Series is of minor importance in Greenbrier County. The soils are generally best suited to timber growth and its sandstones are, as a rule, not suitable for use as building stone. Its shales could possibly be used for making brick or tile but materials of this type are widely distributed and quite common in Greenbrier County.

CHEMUNG SERIES.

GENERAL ACCOUNT AND SECTION, CHEMUNG SERIES.

The Chemung Series of the Upper Devonian, coming just below the Catskill Series and just above the Portage Series, comprises the largest single assemblage of beds in Greenbrier County. It is composed of a mass of interbedded sandstones ranging from flags to massive ledges, alternating with green, olive, and brown shales, and it attains a thickness of 3,000 feet. The sandstones, which are greenish-gray to brown, fine-grained, and micaceous, very hard and compact, and often lenticular, occur throughout the series.

Owing to the lithologic similarity throughout the Chemung, attempts to subdivide it by physical appearance have been rather unsuccessful. The Hendricks Sandstone is apparently present in Greenbrier County and its presence just

beneath the red shales of the Catskill provides a valuable field marker. This sandstone is designated as marking the top of the Chemung Series. Near the middle of the series the sandstones become massive and sometimes contain conglomeratic beds. In the lower half of the series thin beds of limestone composed entirely of shells of marine animals are found and marine fauna and land flora are present at various horizons throughout the series. The following is a generalized section of this series in Greenbrier County:

General Section, Chemung Series, Greenbrier County.

	Thickness. Feet.	Total. Feet.
1. Sandstone, Hendricks, grayish-brown, weathering white, flattened quartz pebbles and with occasional plant and marine fossils	10- 50	50
2. Shales, sandy, green to brown, with some sandstones; ripple-marked beds common	200- 400	450
3. Sandstone zone, with some shales, beds brown and iron-stained on weathering, frequently green on fresh exposure	100- 150	600
4. Shale zone, with some sandstones, gray and green, sandstones flaggy, shales sandy	800-1000	1600
5. Sandstone zone, with some shales, sandstones generally thick-bedded, greenish- to reddish-brown, shales sandy, olive or gray	290- 400	2000
6. Shales, alternating with sandstones, shales olive or gray, sandstones greenish-brown, thinner bedded toward base	600-1000	3000

TOPOGRAPHIC EXPRESSION, CHEMUNG SERIES.

In Greenbrier as well as the remaining West Virginia Counties to the northeast, the Chemung Series, where unaffected by superjacent rocks or structural disturbances, exhibits a topographic relief that is characteristic of this series. The usual topography is that of sharp, narrow ridges with a general profile like that of an inverted V, separated by normal V-shaped valleys. When steeply dipping, this series forms a row of knobs or ridges parallel to the mountains formed by the overlying rocks, as well as to the valleys formed by the underlying and less resistant Middle Devonian shales. (See Plate III). The Chemung Series can be followed across the

State to the northeast, in Pocahontas, Randolph, Pendleton, Tucker, Mineral, Grant, Hardy, and Hampshire Counties where it forms these characteristic rows of sharp knobs and ridges.

AREAL EXTENT, CHEMUNG SERIES.

On Figure 13, page 298, the Chemung Series is outlined along with the remainder of the Upper and Middle Devonian Rocks, and comprises a larger areal extent than the Catskill, Portage, and Genesee Series combined. On Map II the outcrop of this series is shown in much greater detail and on a larger scale. The surface exposures of this series are limited to the eastern portion of the county and lie entirely east of the Greenbrier River. Along Allegheny Mountain the Chemung Series is extensively exposed and forms the greater part of this mountain, the younger Catskill and Pocono Series being retained along the crest at occasional high points. The remaining and longest continuous single exposure lies east of the Greenbrier River throughout the entire length of the county and west of those mountains included in the Browns Mountain Anticline.

CONTACTS, CHEMUNG SERIES.

The contact of the Chemung with the overlying Catskill Series has already been discussed under the description of the latter series, page 299. At the base of the Chemung or at its contact with the Portage Series, the sedimentary record is not clear. There is, however, a rather noticeable change, both lithologic and faunal, between those beds which are typical Portage and those which are Chemung. The former series is predominantly shaly and generally sparing in fossils, with flaggy or platy sandstone members which weather into rectangular blocks. The latter series contains sandstones which are much more massive, and also contains numerous marine horizons, with the guide fossil **Spirifer disjunctus** in profusion. As has been the policy of the West Virginia Geological Survey, the contact of these two series is therefore placed at the point where the flaggy and platy sandstone of the sparingly fossiliferous Portage is succeeded by the more massive sandstones, and abundantly fossiliferous Chemung. Because of the variation in the sandstones a decided break in the topography is often noted which is of great help in areal mapping.

FOSSIL LIFE, CHEMUNG SERIES.

Throughout the limits of Greenbrier County the Chemung Series carries marine fossils in profusion and at several places fossil land plants were noted. Although no attempt was made to obtain a complete fossil record, numerous collections were made from this series. Lists of the fossils identified from these collections were made by the late Dr. John L. Tilton and Prof. Dana Wells and these lists are published in Chapter XIV. The guide fossil **Spirifer disjunctus** is probably the most conspicuous and abundant form but **Spirifer mesacostalis** and **Atrypa hystrix** are quite common.

CORRELATION, CHEMUNG SERIES.

From the above discussion it is evident that the Chemung Series of Greenbrier County correlates with the same series in New York, Pennsylvania, and Maryland and it retains the same lithologic and faunal characteristics. This series has often been described along with the Portage and Genesee Series under the term **Jennings Formation.**

DESCRIPTION OF MEMBERS, CHEMUNG SERIES.

Hendricks Sandstone.

The **Hendricks Sandstone,** comprising the upper member of the Chemung Series and marking the lower limit of the Catskill Series in Greenbrier County, was observed at several points throughout the area. It is generally grayish-brown to reddish-brown, massive, and contains numerous flattened quartz pebbles. It is frequently white on weathered surfaces, occasionally contains marine fossils along with fragments of plants and varies in thickness from 10 to 50 feet.

As noted under "General Account and Section, Chemung Series," there is little upon which to base divisions of the Chemung Series. It appears probable that No. 3 of the General Section, page 301, may in general represent the **Valley Head Sandstone** and No. 5 of the same section may represent the **Elkins Sandstone.** Both of the sandstones mentioned were first named and described by Reger[3].

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[3]Reger, David B., The Tygart Valley Devonian Trees of West Virginia, Am. Jour. Sci., Vol. XV; pp. 52 and 53; Jan., 1928.

ECONOMIC ASPECTS, CHEMUNG SERIES.

From an economic standpoint the Chemung Series is of minor importance. The sandstone members are generally too cross-bedded, or shaly and sometimes quartzitic to be used for building stone, while the shales are too sandy for brick or tile purposes. There is a possibility that some of the sandstones from this series would be suitable for grindstones. Many of the flags of this series are suitable for flagstone walks, the demand for which is now on the ascendancy, the chief objection being, of course, their distance to market. These sandstone flags have been used rather extensively in roads, walls, culverts, walks, etc., by C. C. C. workers.

The shales weather to a thin, yellow soil, quite poor in fertility, so that their use for agricultural purposes is not extensively followed. In the area of this report the outcrops of this series seem well adapted to timber growth.

This series so far as known contains no minerals of value except in regions farther west, although its frequent pockets of iron pyrites have often caused it to be prospected for gold in mountain counties, with invariably disappointing results. To the west, southwest, and northwest, where it is deeply buried under younger rocks, there are rich deposits of oil and gas in some of its coarser members. East of the Greenbrier River there is no possibility of their presence, as these horizons appear at the surface. West of the Greenbrier River the chances of obtaining oil or gas from this series are very slight, as will be discussed in Chapter X under Petroleum and Natural Gas.

PORTAGE SERIES.

GENERAL ACCOUNT, PORTAGE SERIES.

The Portage Series of the Upper Devonian, coming just below the Chemung and just above the Genesee, is composed of a succession of shales and sandstones, both of which are generally greenish-gray in color. The shales predominate but slightly, and are usually arenaceous. The sandstones are rather compact, fine-grained, hard, and flaggy, and vary from 2 to 6 inches in thickness. This series was found to contain

PLATE XXX.—Sandstone conglomerate (Berea?) at or near the base of the Pocono near Anthony.

PLATE XXXI.—Giant ripple-marks in basal Pocono conglomerate on Meadow Creek, 2.6 miles southeast of Neola.

PLATE XXXII.—Natural whetstones formed by jointing in Chemung sandstone on Kates Mountain.

PLATE XXXIII.—Close folding in Portage strata along Anthony Creek, north of Neola.

PLATE XXXIV.—Close folding in Portage strata along Anthony Creek, north of Neola.

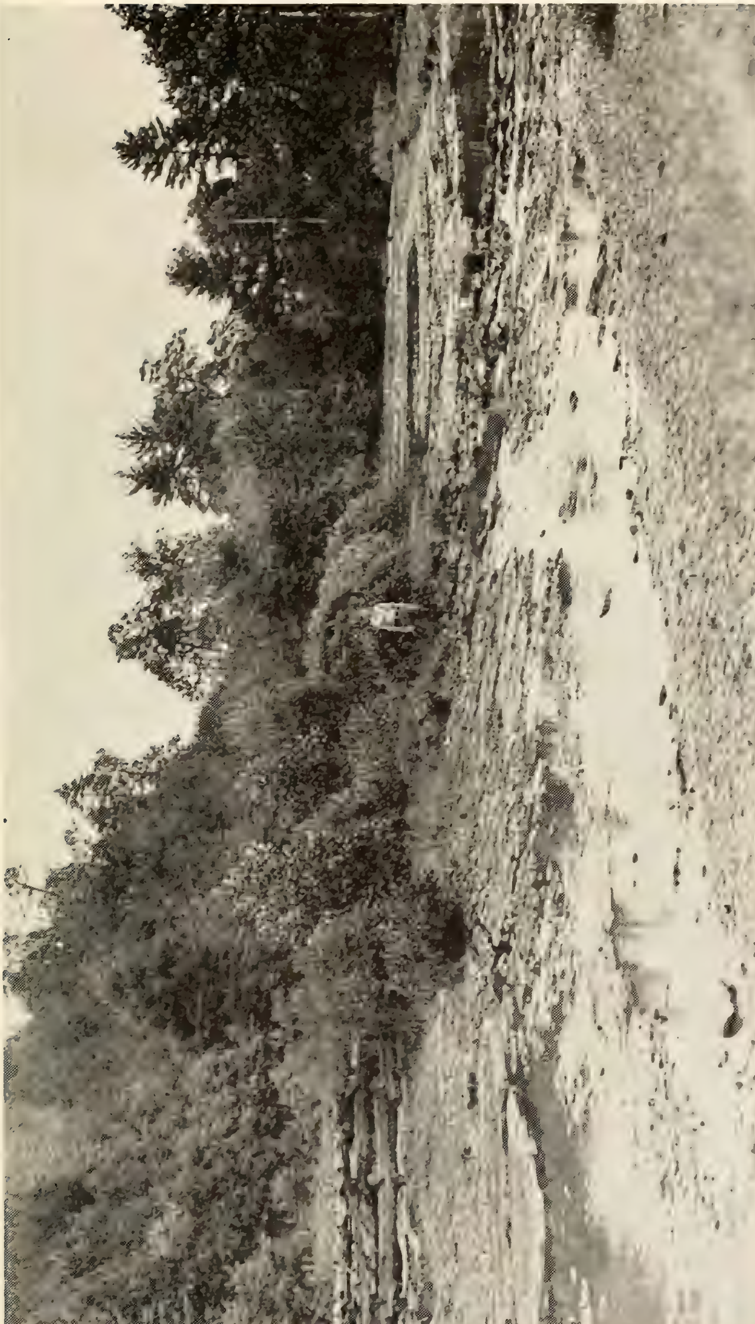

PLATE XXXV.—Interfingering folds in Portage strata, north of Neola.

PLATE XXXVI.—Portage strata in bed of Anthony Creek, 2.3 miles southwest of Neola.

PLATE XXXVII.—Portage shale and flaggy sandstone along the C. & O. Railroad at Tuckahoe.

both marine and plant fossils in Greenbrier. No exposure of this series is so complete that its entire thickness could be measured, but it is approximately 2,000 feet.

In Greenbrier County there exists no basis for a subdivision of this series since it is devoid of any lithologic changes. Paleontologically, however, the fossils collected in this area show some similarity to those in more distant areas. In Maryland, Dr. Swartz[4] has divided those beds lying between the Chemung and Genesee, which correspond to the Portage, as follows:

Parkhead Sandstone Member. Recurrent **Tropidoleptus carinatus** fauna.
- Shale beds.
- Conglomeratic sandstone beds.
  - **Cyclonemina multistriata** zone.
  - **Camarotoechia congregata var. parkheadensis** zone.
  - **Liorhynchus mesacostale** zone.

Woodmont Shale Member.
- Beds containing Ithaca fauna. (**Spirifer mucronatus var. posterus** fauna).
  - **Liorhynchus globuliforme** zone.
  - **Cladochonus—Reticularia laevis** zone.
- Beds containing the Naples fauna. (**Buchiola speciosa** fauna).

As noted in preceding paragraphs lithologic characteristics that would warrant any subdivision in this area are absent, there being a monotonous succession of shales and flaggy sandstones, with no occurrence of conglomeratic beds. An examination of the fossils, however, reveals a similarity of the fauna of the upper half of this series to the Parkhead fauna while the lower half retains fossils characteristic of the Naples.

TOPOGRAPHIC EXPRESSION, PORTAGE SERIES.

The topography formed by the Portage Series is, in general, much like that of the Chemung, except less severe. Due to its less resistant character the ridges and slopes are more gentle and not so high. Where the strata are not greatly disturbed the more sandy ledges of the Chemung form steep ridges which are paralleled by the more gentle slopes of the Portage.

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[4]Charles K. Swartz, Middle and Upper Devonian, Md. Geol. Surv., p. 411; 1913.

AREAL EXTENT, PORTAGE SERIES.

The areal extent of the Portage Series is included in Figure 13 under the heading Upper and Middle Devonian Rocks, on page 298. There are only two long outcrops, both of which are on the eastern side of the Greenbrier River and enter the county on the north on either side of Browns Mountain Anticline and parallel this structural feature to a point about one mile southwest of White Sulphur Springs where they join on this plunging anticline to pass beneath the Chemung Series about 3 miles above the mouth of Harts Run.

CONTACTS, PORTAGE SERIES.

The contact of the Portage Series with the overlying Chemung has already been discussed under the same heading in the description of that series on page 302. At the base of the Portage its contact with the Genesee is generally marked by a change from olive and greenish-gray shales and flagstones of the former to that of brown, or black and sandy, usually fissile, and sometimes slaty shales of the latter, which contain no sandstone flags; and also by the presence of typical Genesee fossils.

FOSSIL LIFE, PORTAGE SERIES.

The Portage Series throughout West Virginia to the northeast has generally been found to carry few fossils except in the Eastern Panhandle where they are fairly abundant. In southern West Virginia this series contains only infrequent fossils. In Greenbrier County fossils were noted at frequent points and several collections were made, although a thorough search was not attempted. Several species of marine fossils and impressions of plants are listed in Chapter XIV, under collections from this series.

CORRELATION, PORTAGE SERIES.

The relationship of the Portage Series of Greenbrier County to its more northeastern counterparts in other States has already been touched upon under the subject of "General Account." Owing to a lack of any apparent lithologic subdivisions, and to the absence of definite faunal subdivisions,

it is inadvisable to make detailed comparisons in this report. Attention has, however, been called to the presence of Naples fauna in the lower portion and of Parkhead fossils in the upper.

The Portage Series occupies the interval between the Genesee and Chemung members of the Jennings Formation of the U. S. Geological Survey.

ECONOMIC ASPECTS, PORTAGE SERIES.

The Portage Series contains neither precious metals nor any other products of present economic interest. The shales are too sandy for brick purposes and the sandstones are too thin for building stone, and also weather into small blocks too small for flagstone walks. The soil is thin and poor except along the bottoms, and here the soil has been carried in and impregnated with that from other series. The soil does seem suitable for timber growth.

GENESEE SERIES.

GENERAL ACCOUNT, GENESEE SERIES.

The Genesee Series, coming just below the Portage and being the basal group of the Upper Devonian, is made up of black, fissile, argillaceous shales, with occasional streaks of bluish-black limestone, followed by dark but more arenaceous beds. These beds are followed by a greenish-gray arenaceous shale with occasional thin sandstone bands. In physical appearance the Genesee resembles the Marcellus but on close examination exhibits a difference, being harder, more arenaceous, and having a slaty cleavage. The thickness of the Genesee varies from 50 to 100 feet and may be even greater, but complete exposures are not available for accurate measurement.

The Genesee Series has not generally been subdivided, being considered as an individual lithologic unit. In Grant County, however, Prouty[5] recognizes two divisions of this series, a lower and black, argillaceous and carbonaceous shale,

[5]W. F. Prouty, Hampshire and Hardy Report. W. Va. Geol. Surv., pp. 323-324; 1927.

and an upper portion of more arenaceous and thin-bedded sandstone. On detailed examination these general divisions are noted in Greenbrier County.

TOPOGRAPHIC EXPRESSION, GENESEE SERIES.

The Genesee Series, in conjunction with the underlying shales of the Hamilton and Marcellus, is usually found in comparatively narrow valleys or lowlands. Its upper portion is more sandy, is slightly more resistant, and forms a gentle sloping topography between the Middle Devonian shales and the overlying Portage Series.

AREAL EXTENT, GENESEE SERIES.

On Figure 13, the areal extent of the Genesee is included under that of the Upper and Middle Devonian Rocks, but is delineated on Map II in much greater detail and on a larger scale. Its thickness is so small in comparison to that of the Upper Devonian that its area of outcrop is very limited. Its exposures are confined to the area east of the Greenbrier River, and limited to two narrow outcrops paralleling either side of the Browns Mountain Anticline from the Pocahontas County line to a point one mile southwest of White Sulphur Springs where they unite on the southern end of this structural fold to pass beneath the Portage Series.

CONTACTS, GENESEE SERIES.

The upper contact of the Genesee with the Portage Series has already been discussed in connection with the latter series on page 306. At its base it rests upon the Hamilton Series which is poorly exposed in Greenbrier County. For some time the writers were uncertain whether or not the Hamilton Series was present at all, but certain collections (Nos. 51 and 55), made from a brown, arenaceous and calcareous shale at points where this series should occur, contain characteristic Hamilton fossils. The lower contact is therefore placed at the base of the black, carbonaceous, fissile shale, with thin limestones, containing a Genesee fauna and at the top of a brown arenaceous shale with a sparse Hamilton fauna.

FOSSIL LIFE, GENESEE SERIES.

The most common fossils in the Genesee are pelecypods, cephalopods, and pteropods. The most abundant species are: **Paracardium doris, Pterochaenia fragilis, Buchiola livoniae, Styliolina fissurella,** and **Bactrites aciculus.** These species apparently range through the series. Several collections were made, the identifications of which were made by Dr. John L. Tilton and these appear in Chapter XIV.

CORRELATION, GENESEE SERIES.

The Genesee of Greenbrier County retains the same general character, both lithologic and faunal, as this same member of the Jennings Formation of New York, which is the type locality of the Genesee, and can definitely be correlated with it. It has been recognized and described in other Appalachian counties of West Virginia as well as in Maryland, Pennsylvania, and New York.

DESCRIPTION OF MEMBERS, GENESEE SERIES

As previously stated the Genesee is generally considered as a single unit with no distinct faunal break by which it might be subdivided. Even though there is a gradual change from predominantly shaly material at the base to sandy beds at the top the transition from one to the other is not sufficiently abrupt to warrant further subdivision. This is also further emphasized by the range of typical Genesee fossils throughout.

ECONOMIC ASPECTS, GENESEE SERIES.

From an economic standpoint the Genesee is of minor importance. It is possible that a portion of these shales would prove suitable for building brick or as a flux with limestone for the manufacture of Portland cement. These shales have frequently been prospected for coal but so far as known no coal has ever been found associated with them. The soils from these weathered shales are usually quite thin and barren and unsuitable for cultivation. The more sandy portions make excellent road-surfacing material where more durable stone is not available.

MIDDLE DEVONIAN ROCKS.

GENERAL STATEMENT.

The Middle Devonian Rocks, as indicated by the classification adopted for the Devonian in Greenbrier County, includes beds of Hamilton, Marcellus, and Onondaga age and rocks of the same age have been grouped under the name **Romney** by the U. S. Geological Survey and others. Rocks of this age have a combined thickness, in Greenbrier County, of approximately 500 feet. At all points observed these rocks are intricately folded and mashed so that accurate measurements, either in whole or in part, are not possible.

In many places it is very difficult to separate the Hamilton from the Marcellus and the outcrops of the two series are shown together on Map II under the name of Marcellus. In Greenbrier County, as well as in many other counties of West Virginia, the lower part of the Middle Devonian carries a mixed Marcellus and Onondaga fauna and this portion is considered to be the equivalent of the Onondaga of New York.

It has been found to be impractical to attempt a detailed subdivision of the Middle Devonian Rocks of Greenbrier County and it is to be remembered that the areas shown as Marcellus on Map II contain beds that are Hamilton, Marcellus, and Onondaga. In a similar manner the Middle Devonian Rocks are described under the Marcellus Series on the following pages.

MARCELLUS SERIES.

GENERAL ACCOUNT, MARCELLUS SERIES.

The Marcellus Series, coming below the Genesee and above the Oriskany, is composed for the most part of black, fissile shale, which becomes flaky and slickensided on compression. These shales are so black and contain so much carbon that they are frequently prospected for coal. Because of this carbon content they have a tendency to weather light colored on exposure. Toward the base of this series there occur thin impure limestones along with calcareous shales. At many localities large concretionary and septarian nodules of ferru-

ginous and calcareous character are common and these concretions often contain considerable barite. In Greenbrier County, the Marcellus Series is confined to the area comprising the Browns Mountain Anticline, and has therefore been subjected to considerable pressure by folding. For this reason it is impossible to get the exact thickness in any of the exposures visited, because of the repetition of beds by minor folding or thinning due to lateral compression, but the Marcellus retains, in this area, an approximate thickness of 500 feet.

TOPOGRAPHIC EXPRESSION, MARCELLUS SERIES.

The Marcellus shales are the most easily eroded series of rocks exposed in Greenbrier County. The low valleys on either side of the Beaver Lick-Coles Mountain area are largely formed in this series, as well as the flat land around White Sulphur Springs. These bottoms are frequently covered by alluvial material.

AREAL EXTENT, MARCELLUS SERIES.

On Figure 13 the Marcellus Series is included under the Upper and Middle Devonian Rocks, but it can be seen in much greater detail and on a larger scale on Map II. This series is also confined to the east side of Greenbrier River, and to the Browns Mountain Anticline. It enters the county from the north on either side of this complex folded area and parallels this structural feature to the vicinity of White Sulphur Springs where its outcrop broadens by minor folding and passes beneath the younger rocks. The Marcellus Series can be seen to good advantage at many points along its outcrop. Along the highway on either side of Coles and Beaver Lick Mountains many opportunities are afforded to examine these rocks.

CONTACTS, MARCELLUS SERIES.

The upper contact of the Marcellus, as herein defined, with the overlying Genesee, has already been discussed under the description of the latter series. At the base the contact is more pronounced, with the black, fissile, typical Marcellus shale resting upon a yellowish-gray or greenish sandstone or

where this sandstone is absent, upon a yellowish to dark, sandy chert. The sandstone and chert are of Oriskany age, a fact that will be described in more detail under the description of the Oriskany Series. Although the contact at the base of the Marcellus is quite distinct there is no concrete evidence of an unconformity.

FOSSIL LIFE, MARCELLUS SERIES.

The Marcellus Series is, as a whole, sparingly fossiliferous. Aside from fossils occurring in the calcareous zones of the lower part and in the occasional brown shale at the top, the life forms are limited to a few species. **Styliolina fissurella** is the most common, with **Liorhynchus limitare** and a few other forms occasionally found. Since the fossil collections were made primarily for stratigraphic mapping, and as the Marcellus is generally followed with slight difficulty because of its lithologic character, few collections were made from this series. At the top of the series the brown shales interfinger with the black shales and two collections from this portion of the Middle Devonian show typical Hamilton forms. In the lower part, lenticular black limestones carry a mixed Marcellus and Onondaga fauna.

CORRELATION, MARCELLUS SERIES.

In view of the foregoing discussion it is clear that the Middle Devonian of Greenbrier County is the equivalent of the Hamilton and Marcellus Series as described in other counties of the State. The upper part has a lithology that is in part similar to the Hamilton of other areas and contains some black shale of the character typical of the Marcellus. The lower portion carries a mixed Marcellus and Onondaga fauna, a relationship that is well recognized in the Allegheny area[6].

DESCRIPTION OF MEMBERS, MARCELLUS SERIES.

As described in the foregoing discussion, it is not feasible to subdivide the Middle Devonian in Greenbrier County. In the counties to the northeast it is possible to differentiate be-

[6]See, Kindle, E. M., Onondaga Fauna of the Allegheny Region, U. S. Geol. Sur., Bull. 508; 1912; see also, Prosser, C. S., Kindle, E. M., and Swartz, C. K., The Middle Devonian Deposits of Maryland, Maryland Geol. Sur., 1913.

tween the various lithologic and paleontologic units as described by Price[7] in Pocahontas County. While similar subdivisions might be made in the northern part of Greenbrier County, they can not be carried the full length of the outcrop of the Middle Devonian.

The **Lower Selinsgrove (Onondaga) Limestone** and **Lower Selinsgrove Shale** of White[8] are represented in Greenbrier County but as the limestone merges into typical Marcellus shale it can not always be recognized.

ECONOMIC ASPECTS, MARCELLUS SERIES.

The Marcellus Series weathers into a gray plastic clay soil which in itself is poor for cultivation, but is generally enriched by a wash from the adjoining hills, and locally by the presence of the Lower Selinsgrove (Onondaga) Limestone. The local limestones, while comparatively pure, are too thin for commercial purposes, their greatest value being in addition of lime to the soil in situ.

The Marcellus shales have a comparatively high carbon content from which various petroleum products may be distilled. No prospecting was done for oil shales in Greenbrier County, in the preparation of this report, but a sample was collected by the senior author from this series in Hardy County, and distilled in the Chemical Engineering laboratory at West Virginia University, which showed the presence of both oil and gas in these shales. Their value for this purpose will need to have further investigation at some future date. These shales have frequently been prospected for coal but so far as known no coal has ever been found associated with them and it is likely that none will ever be found at this horizon in Greenbrier County.

LOWER DEVONIAN ROCKS.

GENERAL STATEMENT.

The Lower Devonian Rocks, composed of the Oriskany and Helderberg Series, are represented in Greenbrier County by limestones, sandstones, and chert, having a total thick-

[7]Price, Paul H., Pocahontas Report, W. Va. Geol. Sur., pp. 221-230; 1929.

[8]White, I. C., Report G-7, Sec. Geol. Sur. of Pa., pp. 79-81; 1883.

ness of approximately 400 feet. A discussion of these beds will appear on succeeding pages. Figure 14 shows the distribution of the Lower Devonian Rocks in the county, while on Map II the same information is shown in much greater detail and on a larger scale.

ORISKANY SERIES.

GENERAL ACCOUNT AND SECTION, ORISKANY SERIES.

The Oriskany Series, which forms the upper subdivision of the Lower Devonian Rocks, is represented in Greenbrier County by a gray or brown, massive, coarse, fossiliferous sandstone at the base, by a gray and dark chert and a thin yellowish- or greenish-gray fossiliferous sandstone at the top. The sandstone at the base of the series generally contains in its upper part a bed of small quartz pebbles which resemble rice or wheat grains and this bed has often been referred to as the "Wheat Grain" Conglomerate. In some places this sandstone contains pockets of limonite (iron ore) with traces of manganese. The ore is apparently of secondary origin and is not everywhere present.

The series has been divided into two members on the basis of their lithologic characteristics. The Huntersville Chert, first named and described in Pocahontas County, is the upper member and its outcrop in West Virginia is apparently confined to Pocahontas, Greenbrier, and part of Pendleton Counties[a], its occurrence in the latter county being only recently discovered by Price. The lower member, the Ridgeley Sandstone, makes an excellent lithologic unit and has been traced south across the State from its type locality in Maryland. Although varying in thickness, its general character, both lithologic and faunal, is retained throughout its outcrop in West Virginia. The Shriver Chert, which is described as the basal member of the Oriskany in the Potomac region of West Virginia, was not recognized in Greenbrier County and its apparent absence will be discussed in more detail under "Cor-

[a]Since the above was written, two feet of Huntersville Chert has been found in Grant County, along State Route 42, 1.6 miles south of Scherr.

relation, Oriskany Series" and "Correlation, Helderberg Series" on subsequent pages. The following generalized section of the Oriskany has been compiled for Greenbrier County:

General Section of Oriskany Series for Greenbrier County.

	Thickness. Feet.	Total. Feet.
Oriskany Series		
Sandstone, classified with **Huntersville Chert,** yellowish or greenish-gray, fine- to medium-grained, calcareous, usually contains abundant glauconite, contains marine fossils	8 to 0	0
Chert, Huntersville, gray to black, hard, tough, bedded, contains occasional layers of fine-grained, glauconitic sandstone, weathers to light-gray "gravel"	60 to 70	70
Sandstone, Ridgeley, gray, calcareous, stained brown on weathering, medium- to coarse-grained, usually contains small quartz pebbles resembling rice or wheat grains near top, marine fossils	12 to 20	90
Helderberg Series (Becraft)		

TOPOGRAPHIC EXPRESSION, ORISKANY SERIES.

Due to its massive, cherty, and sandy character the Oriskany Series is generally found making a bold topography. Most of Bobs Ridge and Coles Mountain are covered with this series and the outcrop of the Oriskany makes bold shoulders or "knobs" paralleling Beaver Lick Mountain.

AREAL EXTENT, ORISKANY SERIES.

On Figure 14, the outcrops of the Oriskany Series are shown along with the underlying Helderberg Series, under the title Lower Devonian Rocks. On Map II the outcrops of this series are shown in greater detail and on a larger scale. The best exposures for study of the Oriskany Series are to be found where Howard Creek cuts through Bobs Ridge and on Jericho Draft near Eckle School.

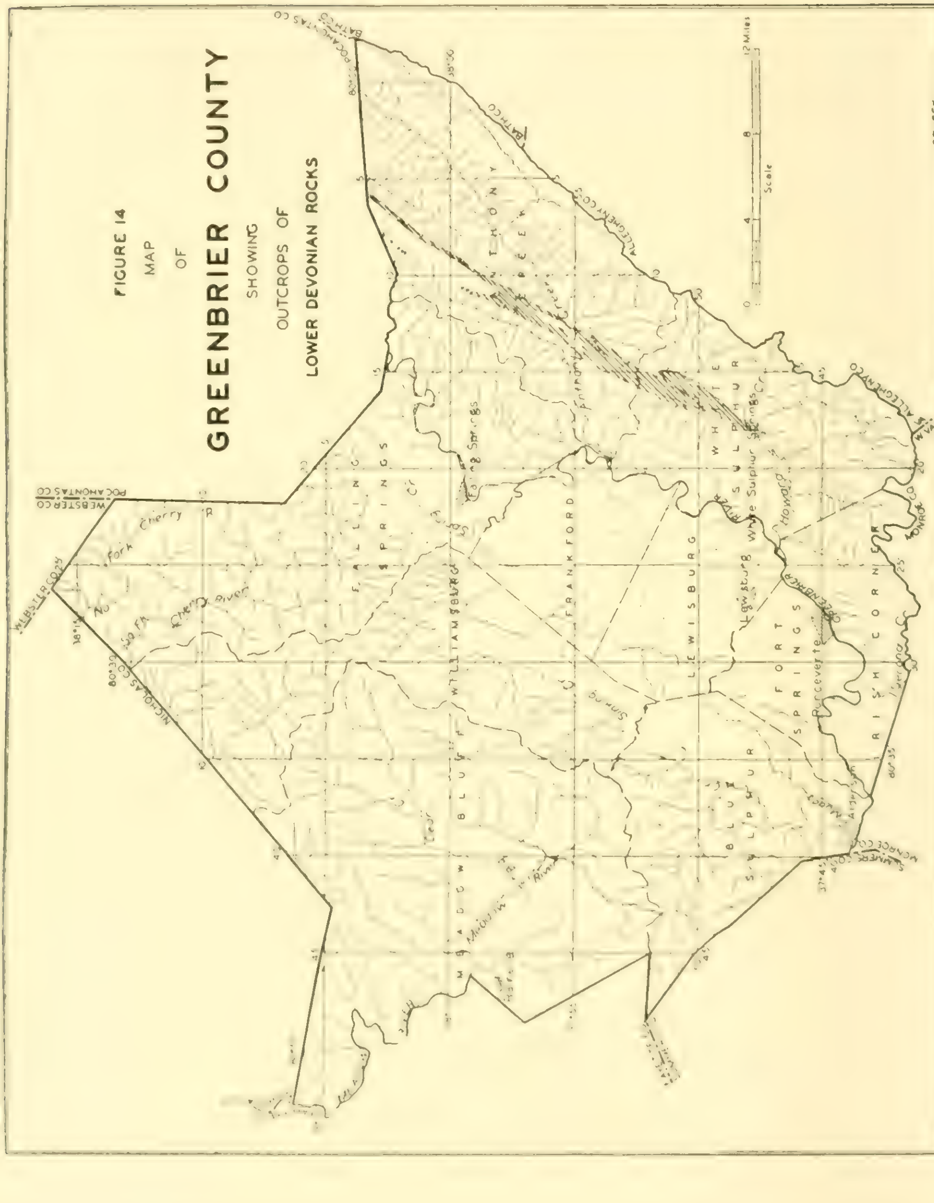
FIGURE 14
MAP
OF
GREENBRIER COUNTY
SHOWING
OUTCROPS OF
LOWER DEVONIAN ROCKS
FALLING SPRINGS
WILLIAMSBURG
FRANKFORD
LEWISBURG
WHITE SULPHUR
FORT SPRINGS
IRISH CORNER
BLUE SULPHUR
MEADOW BLUFF
ANTHONY CREEK
Scale
12 Miles

CONTACTS, ORISKANY SERIES.

The upper contact of the Oriskany Series with that of the Marcellus has already been referred to under the discussion of the latter series. In Greenbrier County these two series are apparently conformable although there is an abrupt change in the lithology of the beds at the contact. The lower limit of the Oriskany is easily recognized by the lithologic difference between the Ridgeley Sandstone and the underlying Becraft Limestone of the Helderberg. The contact appears to be conformable.

FOSSIL LIFE, ORISKANY SERIES.

The sandstones of the Oriskany in Greenbrier County contain an abundance of marine fossils. The chert proper appears to be non-fossiliferous but where sandy layers are present within the chert they generally contain marine fossils. The age relationship and therefore the fossil life of this series will be discussed at greater length under "Correlation, Oriskany Series" and "Description of Members, Oriskany Series."

CORRELATION, ORISKANY SERIES.

It has already been noted that the sandstone at the base of the Oriskany Series as found in Greenbrier County, correlates with the Ridgeley Sandstone of the Potomac region of West Virginia and Maryland. The writers are inclined to agree with Swartz[9] that the Shriver Chert and the Becraft Limestone are equivalent in time of deposition. Swartz has suggested that the difference between the two in lithologic and faunal properties may be accounted for by different environments during deposition. The following quotation from Swartz[10] explains why the Becraft is classified as Helderberg while its time equivalent is classified as Oriskany:

> "Acceptance of the conclusions suggested above [time equivalence of Shriver and Becraft] would still leave some questions as to terminology. If Helderberg group is used primarily with a time significance, I think that the Shriver would necessarily be included in it, although admitting that the Shriver and the Becraft of the Virginia-Maryland area range above the top of the Becraft, and thus above the

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[9]Swartz, Frank McKim, The Helderberg Group of Parts of West Virginia and Virginia, U. S. G. S., Prof. Paper 158-C, pp. 47, 48; 1929.

[10]Ibid., p. 48.

Helderberg of the type area of New York. On the other hand, if the term is accepted as having a lithologic and faunal rather than a purely time significance, then the Shriver would be placed in the Oriskany group, being more closely related in those aspects to the lower Oriskany of southeastern New York than to the members of the type Helderberg. This usage seems somewhat the more acceptable and has been followed here."

Attention has been called to the presence of a prominent bedded chert in the Oriskany Series in Greenbrier County. Swartz[11] has noted the presence of a chert of probable Oriskany age in southwest Virginia. Stow[12] has recently published an excellent summary of the areal distribution of the outcrop of the Oriskany in New York, Pennsylvania, Maryland, Virginia, and West Virginia. On page 546 of that paper, Stow reports that nodules of black chert are characteristic of the top of the Oriskany Sandstone throughout the area of his investigation. It is possible that the Huntersville Chert of West Virginia may correlate with the Schoharie and Esopus Grits, represented as being between the Oriskany and Onondaga in New York. It is also possible that the Huntersville Chert may correspond to the Jemisson Chert (Oriskany age, according to Butts[13]) of Alabama and possibly the Harriman Chert of western Tennessee.

DESCRIPTION OF MEMBERS, ORISKANY SERIES.

Huntersville Chert.

The **Huntersville Chert** of Price[14], named from its occurrence near the town of Huntersville where it has been quarried extensively for road material, is a prominent stratum in Greenbrier County. This chert on fresh exposure is tough, irregularly bedded, nearly black in color, and has a conchoidal fracture. It weathers in a characteristic manner, breaking into angular fragments from one to three inches across. It contains a small amount of lime and occasional streaks of green-

[11]Ibid., see his Figure 8, p. 31; also pp. 68-9.

[12]Stow, Marcellus H., Conditions of Sedimentation and Sources of the Oriskany Sandstone as Indicated by Petrology, Bull., A. A. Petrol. Geol., Vol. 22, No. 5, pp. 541-546; May, 1938.

[13]Butts, Charles, Geology of Alabama, Geol. Sur. of Ala., pp. 145-147; 1926.

[14]Price, Paul H., Pocahontas Report, W. Va. Geol. Sur., pp. 236-7; 1929.

ish-gray glauconitic sandstone. The weathered talus from this member may be light-gray or nearly white in color and it has been used extensively for road material in Greenbrier and Pocahontas Counties.

As previously noted there is a sandstone usually present at the top of the Huntersville Chert in Greenbrier County and the fossils contained in this sandstone are of prime importance in determining the age of the chert. Because of its importance in this connection the following section, published in Chapter V, is reprinted here:

Eckle School Section.

White Sulphur District; measured along the north side of the road, traversing south from Eckle School; arranged in descending stratigraphic order.

		Thickness. Feet.	Total. Feet.
Marcellus Series (in part) (40′)			
Shale, black, crumpled (Coll. 135)		40+	40
Oriskany Series (88′)			
Sandstone, grayish-blue, hard, calcareous. Orbiculoidea roederi?, Rhipidomella musculosa, Hipparionyx proximus, Anoplia nucleata, Camarotoechia oriskania, Spirifer cumberlandiae, Spirifer murchisoni, Anoplotheca dichotoma, Platyceras gebhardi (Coll. 125)....8′	Huntersville Chert	73	113
Chert, blue, black to gray, tough, minute joints, hackly....65			
Sandstone, Ridgeley, grayish-brown to white, fragments of "wheat grain" conglomerate, Spirifer arenosus, Spirifer murchisoni, Rhipidomella musculosa (Coll. 152)		15	128
Helderberg Series (90′+)			
Limestone, gray to blue, specks of limonite, weathers sandy, hard, cross-bedded, Schuchertella woolworthana, Rensselaeria subglobosa var. avus, Rensselaeria sp., Spirifer concinnus (Coll. 123)....50′	Becraft (Coll. 151)	90	218
Limestone, bluish-gray, limonite specks, knobby, Rhipidomella oblata, Dalmanites pleuroptyx (Coll. 124)....20			
Limestone, dark-blue, knobby, irregular bedded bands of hard black chert, Favosites conicus, Spirifer concinnus var. progradius, Dalmanites pleuroptyx....20			

Ridgeley Sandstone.

The Ridgeley Sandstone as found in Greenbrier County is a medium to coarse, yellowish to earthy-brown, massive sandstone varying from 12 to 20 feet in thickness. The yellow-brown color is due, no doubt, to weathering and in some places limonite is so concentrated that it approaches a low-grade iron ore. The limonite appears to be a secondary concentration and was probably derived from the weathering of pyrite. The sandstone is quite fossiliferous and since it has usually been leached of its lime content it is characteristically marked by numerous fossil pits.

In Greenbrier County as well as in Pocahontas and most of the counties to the northeast, there occurs near the top of the Ridgeley a conglomerate, composed of small quartz grains that in size and shape resemble rice or wheat. This is often called the "Wheat Grain" Conglomerate. There are numerous points at which the Ridgeley outcrops in this area but due to the ease with which it weathers only a few of these points offer clean exposures. The best of these exposures are in the vicinity of Bobs Ridge and Eckle School.

ECONOMIC ASPECTS, ORISKANY SERIES.

The Ridgeley Sandstone member weathers into a loose grained sandstone which is easily broken down into sand. This same member has been used extensively in other areas for a glass-sand. Although no sample of this member was taken for analysis, its suitability for glass-sand, as found in this area, is somewhat doubtful, as it contains a much greater amount of impurities than it does farther northeast in West Virginia.

The Huntersville Chert, standing as it does at steep angles, breaks down readily into large deposits of chert "gravel" which is excellent material for road surfacing. These deposits generally contain sufficient lime, iron, and alumina to cement readily when subjected to the crushing effect of traffic.

Both members of the Oriskany Series are proving to be major reservoirs for natural gas in some parts of the Appalachian region. The Oriskany produces oil and gas in Ohio, gas and a little oil in West Virginia, and gas in Pennsylvania

PLATE XXXVIII.—Marcellus Shale showing calcareous (Onondaga?) beds, near the mouth of Slash Lick Run

PLATE XXXIX.—Contorted Marcellus Shale, one mile northwest of Alvon.

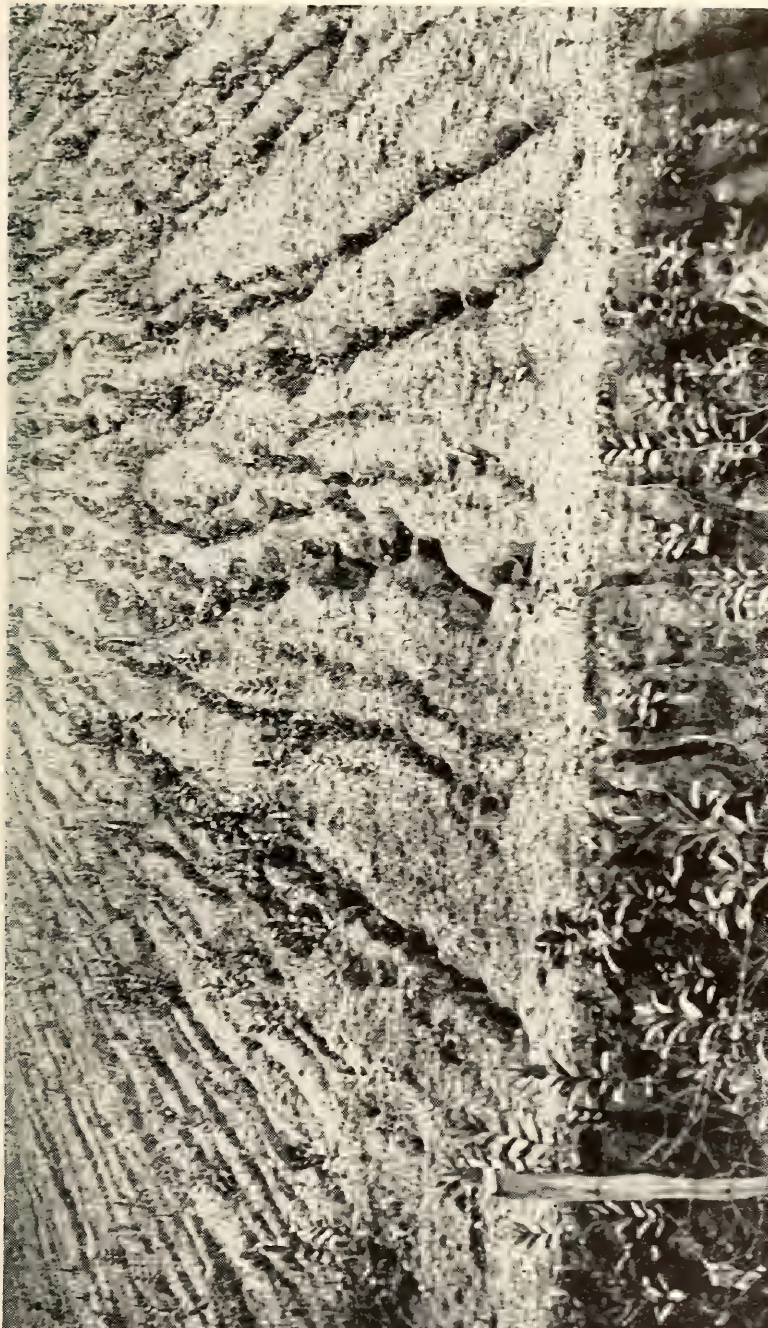

PLATE XL. Gullying in Marcellus Shale on east side of Coles Mountain, one mile south of Alvon.

PLATE XLI.—Healing Springs Sandstone exposed in stream bed where Howard Creek cuts through Bobs Ridge.

and New York. Most of the production is found in the Ridgeley Sandstone member but it now appears that a major gas field has been found in the Huntersville Chert in Fayette County, Pennsylvania. The chances of gas in this series in Greenbrier County will be discussed in Chapter X.

HELDERBERG SERIES.

GENERAL ACCOUNT, HELDERBERG SERIES.

The Helderberg Series, coming just below the Oriskany and being the basal subdivision of the Devonian System in the Appalachian region, is present in Greenbrier County but is thinner than it is throughout the region to the northeast. The Helderberg is essentially a limestone formation. Its lithologic character varies not only in different beds but also in the exposures of different regions. It ranges in color from light-blue to dark-gray and in texture from a massive limestone to a calcareous shale or sandstone. Although the Helderberg, in Greenbrier County, is not exposed in a manner that permits exact measurements, its thickness has been determined as approximately 300 feet.

The Helderberg Series has been extensively studied in Maryland, Virginia, and West Virginia and has generally been divisible into four members, based on both lithologic and faunal grounds. These members in descending stratigraphic order are as follows:

Becraft Member.
New Scotland Member.
Coeymans Member.
Keyser Member.

All of these members are probably present in Greenbrier County. The presence of the Becraft, New Scotland, and Keyser Members is apparently proved and although it could not be definitely identified, the Coeymans is probably represented in this area.

TOPOGRAPHIC EXPRESSION HELDERBERG SERIES.

In Greenbrier County, the Healing Springs Sandstone (New Scotland) is somewhat more resistant to erosion than is the Oriskany. This effect is plainly shown along the eastern

side of Beaver Lick Mountain where the Healing Springs is often found on the more prominent knobs. Due largely to the resistant character of the sandstone, the Helderberg Series outcrops on much of the south end of Beaver Lick Mountain and the north end of Coles Mountain.

AREAL EXTENT, HELDERBERG SERIES.

The areal extent of the Helderberg Series is shown on Figure 14 along with the Oriskany Series under the title Lower Devonian Rocks. It is also shown on Map II by a separate color in much more detail and on a larger scale. As mentioned in the foregoing paragraph this series outcrops along the eastern side of Beaver Lick Mountain, on the south end of the same mountain, on the north end of Coles Mountain, and the upper part of the series is exposed along Howard Creek and Jericho Draft.

CONTACTS, HELDERBERG SERIES.

The upper contact of the Helderberg Series with the Oriskany has already been discussed under the same heading in the description of the latter formation. The lower limit has long been the subject of many lengthy papers and discussions. In the local area conditions are not favorable for a detailed study of this question, the exposures being few and poor. In conformity with former studies of this contact, with particular reference to the northeastern counties of West Virginia, the boundary that seems best fitted is the plane between the more massive limestones of the Helderberg and the more flaggy and purer beds of the Bossardville. This division seems best adapted on both lithologic and faunal grounds, although certain species of Silurian age are found to exist on into the Helderburg.

FOSSIL LIFE, HELDERBERG SERIES.

The Helderberg Series of Greenbrier County is abundantly fossiliferous. A number of collections were made from these rocks and lists of the fossils identified are published in Chapter XIV. Excellent exposures for the collection of the marine fossils of the Helderberg were noted along Howard Creek in the vicinity of Bobs Ridge and at Eckle School.

CORRELATION, HELDERBERG SERIES.

Attention has already been called to the fact that all of the members of the Helderberg are represented in Greenbrier County with the single possible exception of the Coeymans member. Under "Correlation, Oriskany Series" the apparent time equivalence of the Shriver Chert and the Becraft member has been discussed. Swartz[15] has made a regional study of the Helderberg in near-by areas and while his work does not include the Greenbrier area, the Helderberg of this area does fit his discussion nicely. The reader is referred to Swartz's paper for the more technical aspects of the correlations. In many publications and particularly the U. S. Geological Survey Folios, the Helderberg Series is included under the description of Lewistown Limestone.

DESCRIPTION OF MEMBERS, HELDERBERG SERIES.

Becraft Member.

In Greenbrier County the Becraft Member is a light-gray to dark bluish-gray limestone, somewhat argillaceous or arenaceous at the top, purer near the middle, and arenaceous toward the base. The limestone carries numerous nodules of black chert and silicified fossils are common. The thickness of the member appears to vary between 60 and 100 feet but areas in which it outcrops have generally been so disturbed by folding that accurate measurements are difficult to obtain. The contact of the Becraft with the overlying Oriskany and with the underlying New Scotland appears to be transitional, with the upper contact the more distinct of the two. It is possible that the extreme lower part of the Becraft, as herein described, carries New Scotland fossils and this possibility needs further attention from the paleontologists.

In some places the middle portion of the Becraft is fairly pure limestone and may furnish some agricultural lime or road material. In general, however, the Becraft is too impure for most uses and the chert nodules would probably interfere with satisfactory crushing. See Chapter XII for a further discussion of the commercial possibilities of the Becraft.

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[15]Swartz, Frank McKim, The Helderberg Group of Parts of West Virginia and Virginia, U. S. G. S., Prof. Paper 158-C; 1929.

New Scotland Member.

The New Scotland is represented in Greenbrier County by a calcareous sandstone 25 to 40 feet thick. This sandstone has been named the **Healing Springs** by Swartz[16], from its occurrence near Healing Springs, Virginia. In general the sandstone is medium- to fine-grained, light-gray to light-brown in color and is characteristically marked by numerous casts of medium- to large-sized crinoid stems. Being somewhat quartzitic, the sandstone weathers in bold relief and is quite conspicuous in the vicinity of Alvon. As mentioned above, the lower part of the limestone herein described as Becraft carries some fossils that are suggestive of the New Scotland. There is no prominent lithologic break within the limestone and the contact of the limestone with the underlying Healing Springs is blended as indicated in the following section:

White Sulphur Springs Section.

White Sulphur District; 1 mile north of White Sulphur Springs, on Howard Creek; measured on the west side of Bobs Ridge; arrangement in descending stratigraphic order.

	Thickness. Feet.	Total. Feet.
Helderberg Series (110′+)		
Limestone, blue-black, nodular, with blue-black nodular chert	80	80
Sandstone **Healing Springs**, gradual transition from overlying limestone, light-gray to light-brown on fresh exposure, calcareous, fossiliferous	30	110

The lower part of the Healing Springs Sandstone is not well exposed in Greenbrier County and the exact nature of its contact with the underlying limestone is not known.

The fossils collected from the horizon of this sandstone were badly weathered and due to this fact the New Scotland age of this sandstone may be considered to be slightly in doubt. However, on the basis of its lithologic characteristics, its stratigraphic position, and its fauna, which strongly suggest New Scotland forms, the correlation of this sandstone with the Healing Springs of the type locality appears to be established.

Chemical analyses of samples collected from the Healing Springs Sandstone are presented and discussed in Chapter XII.

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[16]Ibid., p. 41.

Coeymans Member.

The horizon at which the Coeymans would be expected is usually not exposed in Greenbrier County. Under these circumstances it was not possible to prove either the presence or absence of rocks of this age in the territory of this report. If it is present in Greenbrier County the Coeymans Member is not over 40 feet thick and is probably less than 10 feet thick.

Keyser Member.

In Greenbrier County the Keyser Member is best exposed along the north side of Anthony Creek, on the west limb of the Browns Mountain Anticline, just west of Alvon. The following section illustrates its occurrence at this point and is part of the Alvon Section—West Side, published in Chapter V:

Part of Alvon Section—West Side.

	Thickness. Feet.	Total. Feet.
Devonian.		
Helderberg Series.		
Keyser Member (215'±).		
Concealed and shaly limestone (Coeymans, if present)	35	35
Limestone, sandy to shaly	20	55
Limestone, gray, platy, calcite streaks	20	75
Limestone, blue-gray, massive, calcite streaks	40	115
Limestone, blue-gray	20	135
Concealed and gray limestone	65	200
Sandstone, **Clifton Forge**, fine-grained, hard, porous, and limonite stained from weathering, upper portion strongly cemented by silica	15	215
Silurian.		

At the above locality the rocks are vertical or slightly overturned and accurate total measurements are difficult to obtain. The sandstone noted at the base of the Keyser in the above section is considered to be the same as the Clifton Forge Sandstone of Swartz[17]. This sandstone is either concealed or absent at many localities in the county. The lower contact of the Clifton Forge at the above section is poorly exposed but it is assumed that it marks the base of the Helderberg.

[17]Ibid., p. 29.

ECONOMIC ASPECTS, HELDERBERG SERIES.

Some of the limestone beds of the Helderberg are of sufficient thickness and purity for lime-burning and other purposes for which a fairly pure limestone is required. It is doubtful if the Helderberg limestones will be used for this purpose, however, since the pure limestones of the Silurian and Mississippian present better quarry sites in the area. The Healing Springs Sandstone might be used for glass-sand. The commercial possibilities of the limestones and sandstones will be discussed in Chapter XII. In some places the residual soil left from weathering of the Keyser beds contains nodules of manganese ore and this together with a discussion of the springs that emerge from Helderberg rocks will be discussed in Chapter XIII.

CHAPTER IX.

STRATIGRAPHY—SILURIAN ROCKS.

GENERAL STATEMENT.

The Silurian Rocks as found in Greenbrier County, West Virginia, and as indicated in the General Columnar Section, page 133, have been classified, in descending stratigraphic order, with certain titles being added in parentheses to indicate supposed contemporaneous nomenclature, as follows:

	Thickness. Feet.	Total. Feet.
Salina Series		
Bossardville Group (Tentaculite, Manlius, Tonoloway)	250	250
Rondout Waterlime Group (Wills Creek)	200	450
Niagara Series (McKenzie)	100	550
Clinton Series (Rockwood and Cacapon of U. S. G. S. Folios; Rochester of Maryland and Clinton of New York)	600	1150
White Medina Series (Tuscarora, Albion, Clinch, of U. S. G. S. Folios)	100	1250
Red Medina Series (Juniata of U. S. G. S. and Queenston Shale of other Reports)	800	2050

As shown on Figure 15, the outcrop of the Silurian in Greenbrier County is confined to the immediate vicinity of Beaver Lick Mountain. The rocks have been severely folded, mashed and in some places metamorphosed so that accurate measurements are very difficult to obtain. At no point was it possible to measure a complete succession of the beds in detail, because of duplication by folding, or on account of concealed intervals, but exposures of all the individual groups are available at one point or another.

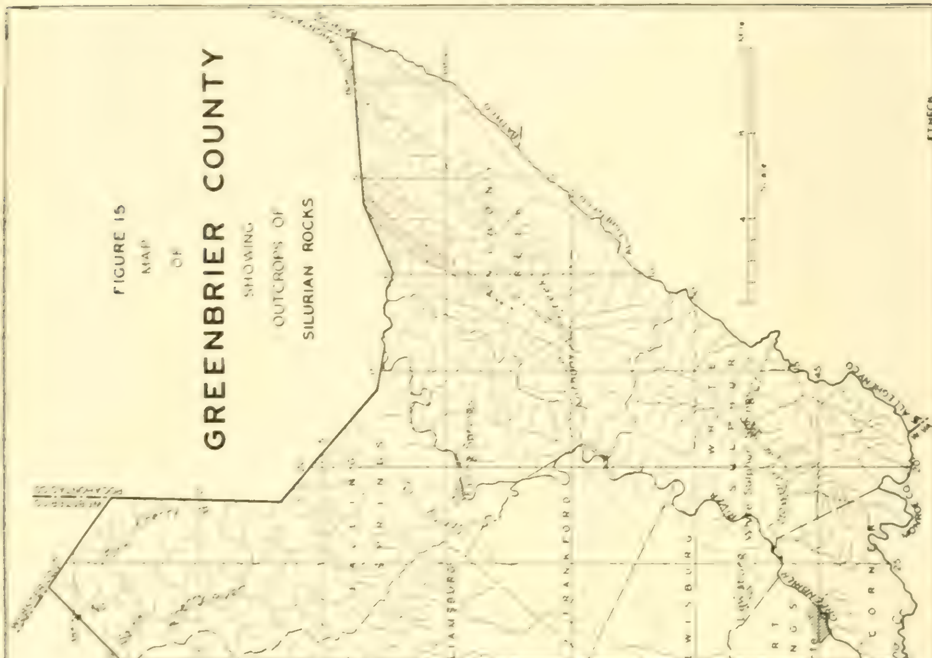
FIGURE 15
MAP
OF
GREENBRIER COUNTY
SHOWING
OUTCROPS OF
SILURIAN ROCKS

The upper boundary of the Silurian is generally agreed upon as coming at the base of the Helderberg. The lower boundary or the contact of the Silurian with the Ordovician has long been a subject of debate, nor is there yet a general agreement on this point. It has been the policy of the West Virginia Geological Survey to place the base of the Silurian at the bottom of the **Gray Medina Sandstone.** As the oldest rocks exposed in Greenbrier County are the Red Medina sandstones and shales, there is no information available in this area that might throw any additional light on this controversy. In this report the Medinas are considered to be of Silurian age.

The Silurian as thus delimited begins in Greenbrier County with Red Medina beds, suggesting rapid deposition with poor sorting of the materials and estuarine or land deposits. In the following epoch the beds are mainly of white sand with white quartz pebbles that represent a shore phase of a transgressing sea. As the sea deepened there followed a succession of shales and sandstones of lower and middle Clinton with marine fossils. Following this the beds became more calcareous, contain marine fossils, and show the effect of a retreating sea marked by the Bossardville laminated limestones.

The Silurian deposition is a good illustration of a cycle of sea inundation and retreat, marked by times of recession, slight reversals, and the separation of sea basins.

SALINA SERIES.

GENERAL ACCOUNT, SALINA SERIES.

The Salina Series as found in Greenbrier County is divided, following earlier subdivisions, into the upper portion, Bossardville, containing platy and laminated limestones and the lower portion, Rondout, which is made up of interbedded calcareous shales and limestones. In this area clean-cut exposures of the Salina are not available and while, in general, there is a marked contrast between the two groups, the change from one to the other is gradual rather than abrupt.

It is the Salina Series that contains the rock salt and anhydrite that is found in the drilled wells in the western part of the State. A search was made for gypsum or anhydrite at the outcrop of this series in Greenbrier County but none was found.

TOPOGRAPHIC EXPRESSION, SALINA SERIES.

The Salina Series in Greenbrier County can not be spoken of as having a characteristic topography. In this area the beds have been greatly folded and are now found standing at steep angles along the east side of Beaver Lick Mountain. The Salina limestones, along with the Niagara, due to their soluble character, are generally found in narrow valleys between the more resistant Lower Devonian rocks and the underlying Clinton and Medina Series.

AREAL EXTENT, SALINA SERIES.

The areal extent of the Salina Series is shown on Figure 15 along with the rest of the Silurian. These same exposures are shown on Map II in much greater detail and on a larger scale. The outcrop of this series is confined to Beaver Lick Mountain and the northern end of Coles Mountain.

CONTACTS, SALINA SERIES.

The upper contact of the Salina Series with the Helderberg of the Devonian has already been discussed under the latter series. The lower contact of this series is not well exposed in Greenbrier County and its exact nature is not known. It is assumed, however, that the beds above and below it are conformable and that the Bloomsburg Group is absent because of non-deposition or changing conditions of sedimentation.

FOSSIL LIFE, SALINA SERIES.

In Greenbrier County the Salina rocks do not yield their fossils readily but fragments of marine fossils were noted in these rocks at various localities. **Camarotoechia tonolowayensis** and **Camarotoechia litchfieldensis** were the most abundant of those noted in the field.

CORRELATION, SALINA SERIES.

Certain relationships of the Salina Series as found in Greenbrier County with their northeastern counterparts in other States have already been suggested. More definite detailed correlation necessitates better exposures and more numerous systematic fossil collections than are available in this area. That the upper or Bossardville Group of this series

correlates with this same formation to the northeast is quite certain. and this in turn is essentially synonymous with the Tentaculite. Manlius. and Tonoloway. as pointed out by Reger in Chapter XIV of the Mineral and Grant County Report. The Rondout Waterlime Group although somewhat attenuated retains in general the same character as found at its type locality in New York. and can safely be correlated with it. This group correlates with the **Wills Creek Formation** of Maryland, and is included under the **Lewistown Limestone** in the Monterey Folio.

DESCRIPTION OF GROUPS, SALINA SERIES.

BOSSARDVILLE LIMESTONE GROUP.

The Bossardville Group is made up largely of limestone which is thin-bedded and laminated. These thin beds of laminated limestone are often separated by thin shale partings, the limestone slabs weathering out and frequently covering the surface slopes in the area of the outcrop. so that it is easy to distinguish this formation at some distance. These slabs or fragments often have a noticeable cleavage. and break in rough geometric figures. Certain beds carry an abundance of fossils of few species. In the general section this group is shown to be about 250 feet in thickness. The figure may be excessive as no complete exposures were available for accurate measurement.

RONDOUT WATERLIME GROUP.

The Rondout Waterlime consists of interbedded calcareous shale. calcareous mud rock. and argillaceous limestone with an occasional sandstone. When seen in fresh exposures many of the strata seem to consist of compact. dark. purplish-blue limestone of considerable durability, but on weathering. however. the color of these strata changes to a dirty greenish hue. This same characteristic was noted by the writer in other counties of this State to the northeast. especially Pocahontas, Pendleton. Hampshire. and Hardy, and is also reported in Maryland. This feature is due to the large amount of clay that is present in the rock. Alternating with these rocks are beds of thin-bedded. fissile. and calcareous shale that are occa-

sionally dark. With these highly argillaceous beds are occasional strata of purer limestone. The Rondout Group as found in this area has a thickness of about 200 feet.

ECONOMIC ASPECTS, SALINA SERIES.

In Greenbrier County the principal economic value of the Salina Series is its use for agricultural purposes, a great deal of the limestone being suitable for burning, both for agricultural lime and Portland cement. The upper portion, or Bossardville Group, generally carries a high calcium carbonate content, the main impurity being silica or alumina which breaks down readily, so that long burning is not necessary. In the Rondout Group certain portions have been used for the manufacture of natural cement in northeastern West Virginia and western Maryland, but in Greenbrier County chemical analyses have not been made. Because of its generally inaccessible location, its value for road material in this area is overshadowed by the more readily obtainable limestone from the Greenbrier Series and the Huntersville Chert of the Oriskany Series.

NIAGARA SERIES.

GENERAL ACCOUNT, NIAGARA SERIES.

The **Niagara Series**, coming just below the Salina Series and slightly above the **Keefer Sandstone** of the Clinton Series, is a succession of shales and beds of limestone. The shales are generally buff or drab while the limestones vary from bluish-gray to dove-colored. This series, because of its non-resistant nature and its occurrence at high angle dips is poorly exposed, so that accurate measurements were difficult to get. An interval of 50 to 100 feet will include both the minimum and maximum thicknesses of this series in Greenbrier County.

The Niagara beds of New York were early subdivided by James Hall into Niagara or **Lockport Limestone** at the top, followed by the Niagara or **Rochester Shale** at the base. In the Pawpaw-Hancock Folio, Stose and Swartz described those beds occurring between the Bloomsburg red sandstone member of the Wills Creek Shale and the Clinton Series as **McKenzie Formation**, including the Keefer Sandstone. In its Silurian

volume, the Maryland Geological Survey considers the Keefer Sandstone as of Clinton age. It is, therefore, the beds that occur between the Salina Series and the Keefer Sandstone that are classified as the Niagara Series in this report. In this area there is not sufficient variation in lithology from top to bottom to form the basis of any subdivision.

TOPOGRAPHIC EXPRESSION, NIAGARA SERIES.

The Niagara Series, being predominantly shaly, is much less resistant to weathering than the Keefer Sandstone below. It has no tendency to cliff forming and is seldom seen in good exposures save in localities where it has been uncovered in stream gullies or by artificial cuts.

AREAL EXTENT, NIAGARA SERIES.

The Niagara Series with its narrow outcrop, the beds of which are usually standing at steep dips, has a very limited areal extent in Greenbrier County. Its exposures are shown on Figure 15 along with the Silurian Rocks, on page 328, and in much greater detail and on a larger scale on Map II accompanying this report. These exposures are limited to the Browns Mountain Anticlinal area, which is located east of the Greenbrier River.

CONTACTS, NIAGARA SERIES.

The upper contact of the Niagara with the Salina above has already been discussed under the same heading on the Salina Series, page 330. The lower limit of the Niagara is difficult to determine both because of the scarcity of fossils in this horizon and because there are few localities where the rocks immediately above the Keefer Sandstone are well exposed. For this reason and to facilitate areal mapping, the contact is placed at the top of the Keefer Sandstone. It is probable, however, that a few feet at least of those beds occurring above the Keefer are of Rochester age.

FOSSIL LIFE, NIAGARA SERIES.

Few collections were made from the Niagara Series but marine fossils in this series are quite common, the following being particularly noted: **Favosites,** both **marylandica** and **niagarensis, Leptaena rhomboidalis,** gastropods, and several species of ostracods.

CORRELATION, NIAGARA SERIES.

The relationship of the Niagara Series as found in Greenbrier County to its counterparts, particularly to the northeast, in West Virginia, Maryland, and New York, has already been briefly touched upon under previous headings. It is not considered advisable to attempt any subdivision of this series other than to note the points of similarity with synonymous beds in other areas. In the upper two-thirds of the Niagara beds, there occurs an assemblage of fossils, all of which are found in the McKenzie Formation of Maryland, and would seem to be synonymous with it. In view of this similarity it would seem that the Niagara Series as found in this area is essentially of the same age as the McKenzie of Maryland.

DESCRIPTION OF MEMBERS, NIAGARA SERIES.

As already stated the local Niagara appears to be confined to a single lithological unit and hence the general description of the series, as already given, embraces the description of the members.

ECONOMIC ASPECTS, NIAGARA SERIES.

From an economic standpoint the Niagara Series is of minor importance, its chief value being, when found on comparatively level land, as an agricultural soil. The shales are excellent for surfacing light-traffic roads as they contain a natural mixture of sand and clay with some lime to act as a cementing agent. Just west of Alvon the C. C. C. workers have established a small temporary quarry in this series and are using the limestone for masonry work.

CLINTON SERIES.

GENERAL ACCOUNT, CLINTON SERIES.

The **Clinton Series**, occurring next below the Niagara, is largely of arenaceous and argillaceous character. The shales are usually a yellowish-buff or greenish to gray and have thin beds of buff-weathering sandstones. The upper limit, as defined in this report, is marked by the Keefer Sandstone, beneath which lie yellow and gray thin-bedded shales and platy

sandstones with an occasional thin limestone. In most localities the presence of the **Fossil Ore Horizon** is found above the middle, which in turn was preceded by the deposition of beds predominantly shaly but containing platy sandstones with occasional thin limestones. Toward the base the sandstones increase in number and thickness and are more compact and greenish to gray in color, except the **Iron Sandstone**, which occurs in the lower portion, and which is generally more massive and red in color. The Clinton Series, although no complete and continuous exposures are found in this area, is approximately 600 feet in thickness.

The Clinton Series has received considerable attention from many geologists and hence there is a great deal of literature available with reference to it. The early work on those beds was done by Eaton, Hall, and others in New York State where its character is such that subdivisions as found there can not be applied with certainty in this area. In later work in Pennsylvania, the subdivisions of H. D. Rogers, as later revised by Dr. I. C. White[1], seem best adapted to the local area, except that the Keefer Sandstone that is now recognized as of Clinton age was not included. Their subdivision follows in descending stratigraphic order:

Upper Shales.
Ore Sandstone and Fossil Ore.
Middle Shales.
Iron Sandstone and Block Ore.
Lower Shales.

In a still later work, Swartz[2] has given these beds the following classification:

- Clinton Group.
  - Rochester Formation.
    - Upper Shale and Limestone.
    - Roberts Iron Ore.
    - Keefer Sandstone Member.
  - Rose Hill Formation.
    - Upper Shale beds with some purplish bands.
    - Cresaptown Iron Sandstone.
    - Lower shale and sandstone beds.

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[1]See Second Geol. Surv. of Pa., Reports G7, pp. 111-112; 1883; and T3, p. 132; 1885.

[2]Charles K. Swartz, Silurian volume, Md. Geol. Surv., pp. 27-35; 1923.

It has been previously stated that in this county the Clinton is confined to those beds occurring between the top of the White Medina Sandstone and the top of the Keefer Sandstone, but at the same time recognizing the possibility of a small portion of those beds occurring immediately above the Keefer as being of Rochester or Clinton age. Since sufficient exposures are not available in this area to add much to a detailed discussion of the finer aspects of this series, the following subdivisions are used:

Upper Shales.
Keefer Sandstone.
Shales and thin limestones.

Fossil Ore Horizon
Middle Shales (including platy sandstones and thin limestones).

Iron Sandstone.

TOPOGRAPHIC EXPRESSION, CLINTON SERIES.

The Keefer Sandstone at or near the top of the Clinton as well as the Iron Sandstone in the lower portion are both quartzitic in character and resistant to weathering and frequently form sharp and prominent ridges. The lower portion is more sandy than the Upper and Middle Shales so that the lower portion of this series forms prominent shoulders along with the underlying White Medina. The upper and middle shaly members are less resistant and form a line of weakness in the Clinton outcrop represented by a depression in the topography along the east side of Beaver Lick Mountain.

AREAL EXTENT, CLINTON SERIES.

On Figure 15, the outcrops of the Clinton are shown, and can be seen in greater detail and on a larger scale on Map II accompanying this report. The exposures of the Clinton are confined to the Beaver Lick Mountain area in the northeastern portion of the county. Several isolated outcrops of this series occur in the folds of Beaver Lick Mountain but are all poorly exposed. The highway west of Alvon cuts across the Browns Mountain Anticline, but an accumulation of talus practically conceals these outcrops.

PLATE XLII.—Apparent unconformity at or near base of Helderberg Limestone. At springhouse of Alvon Springs Nos. 1 and 2 southwest of Alvon.

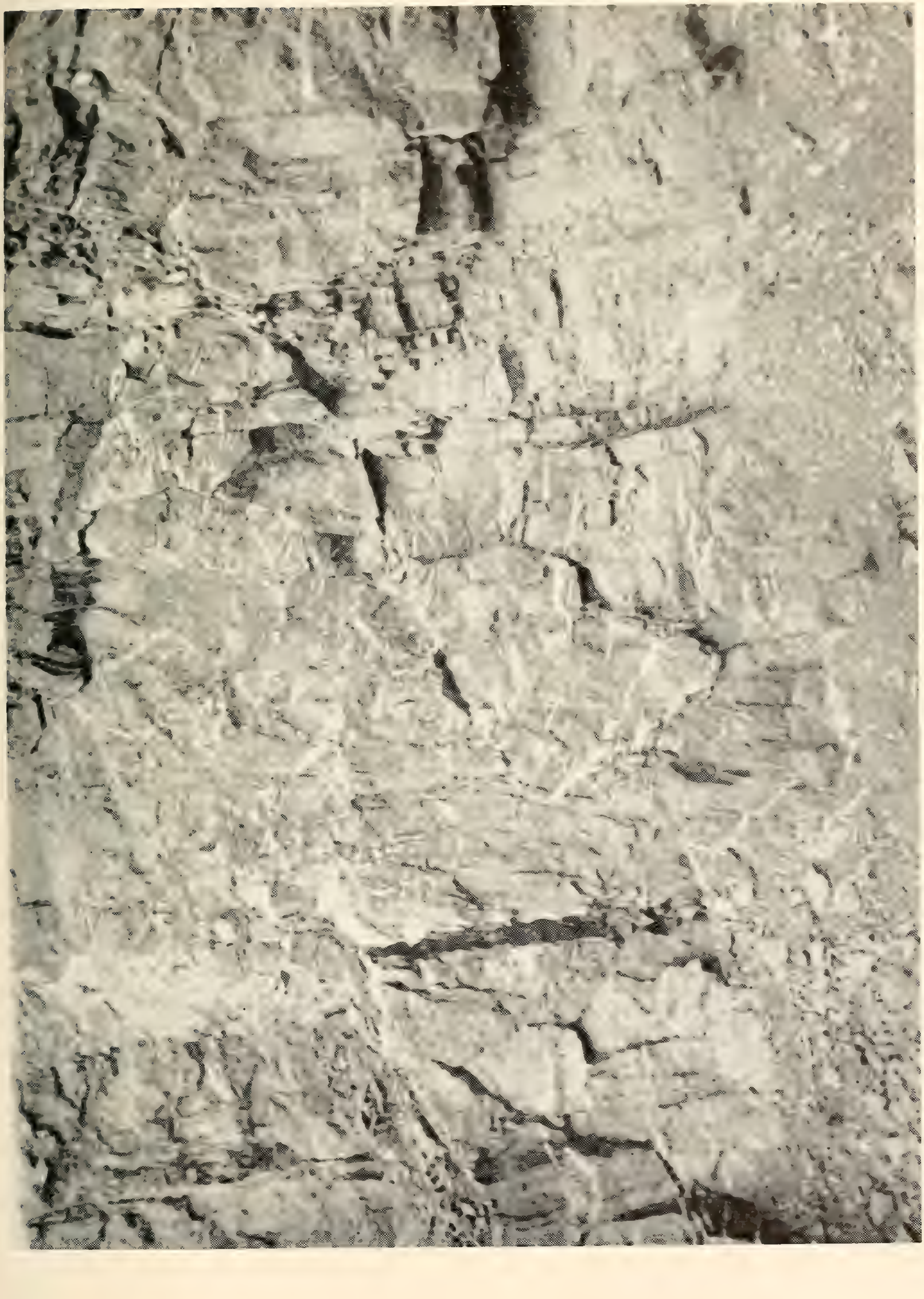

PLATE XLIII.—Niagara Limestone showing numerous veins of calcite, on the north side of Anthony Creek, 0.5 mile west of Alvon.

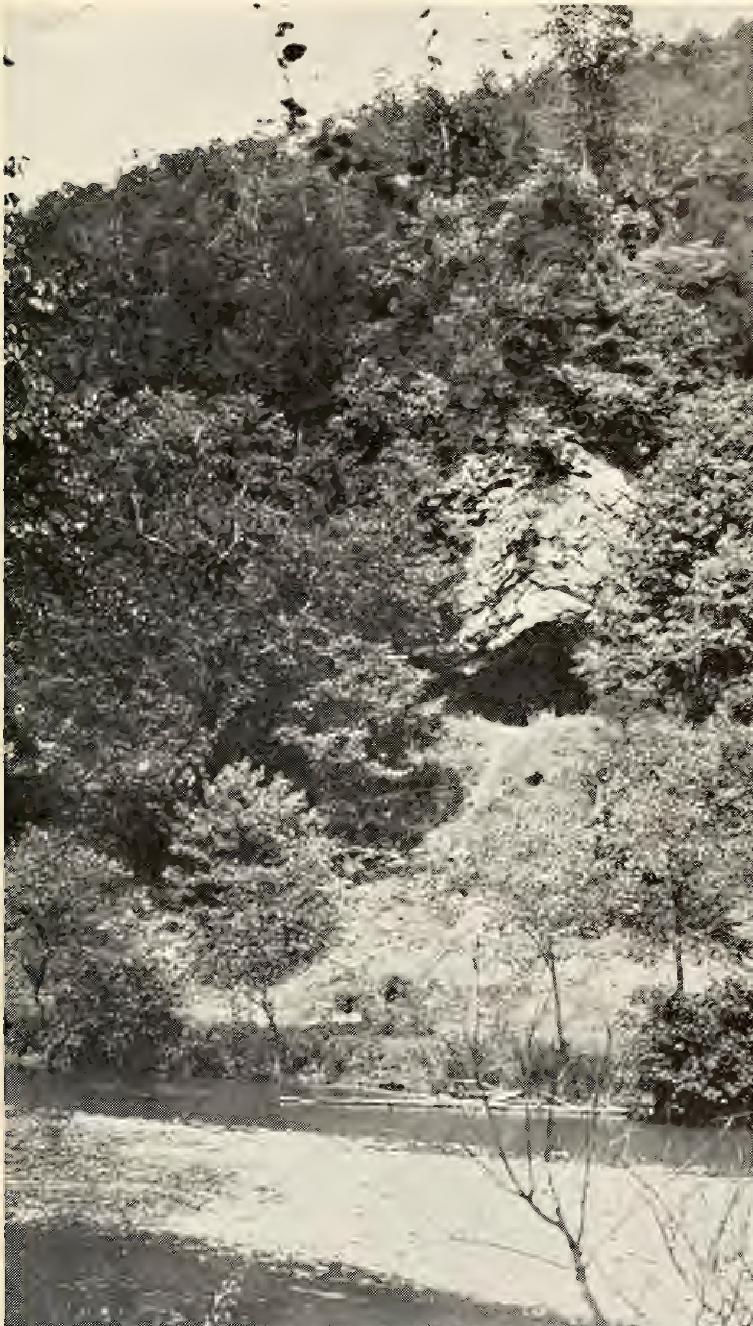

PLATE XLIV.—Anthony Cave, formed by a fold in the Keefer Sandstone. On north side of Anthony Creek, 0.45 mile west of Alvon.

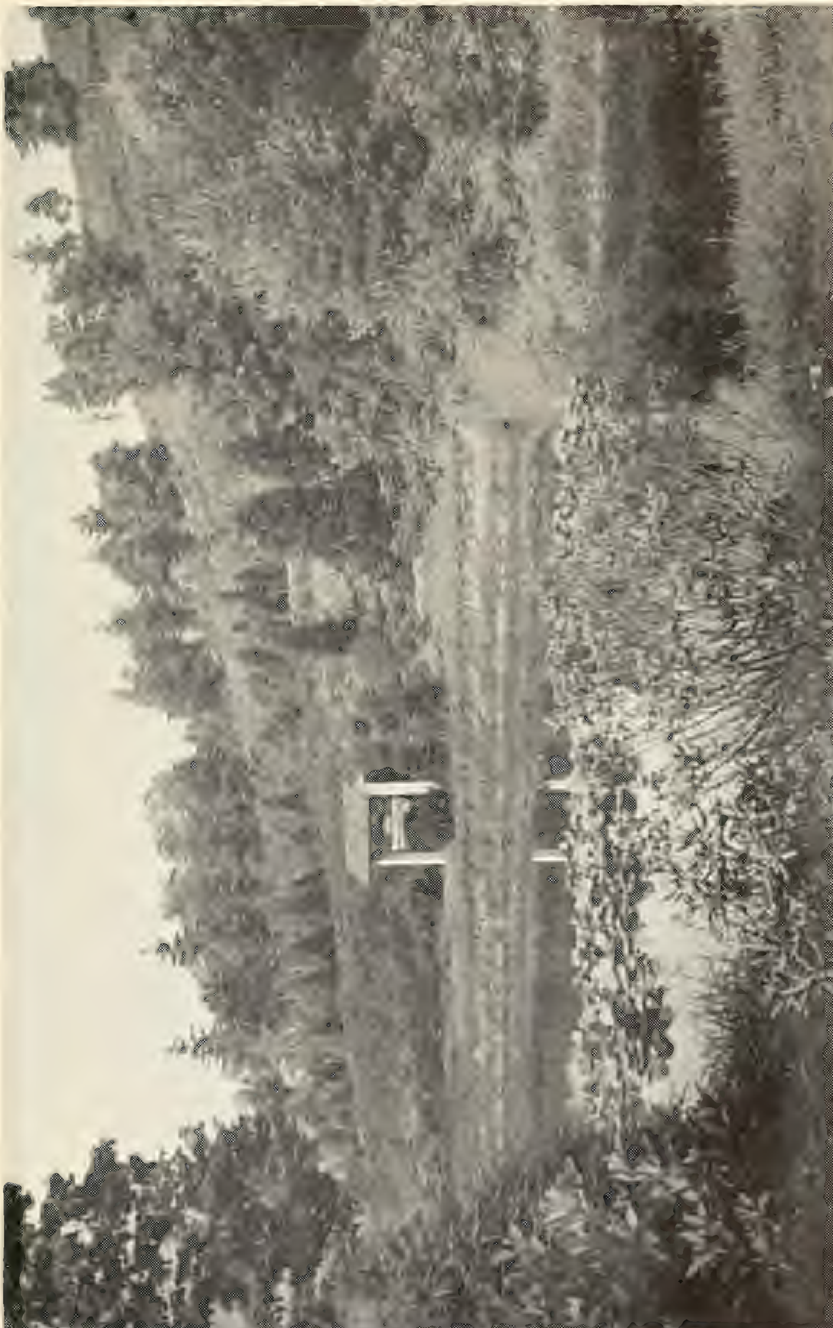

PLATE XLV.—La Barr Evergreen Nursery north of White Sulphur Springs.

CONTACTS, CLINTON SERIES.

The upper contact of the Clinton Series with the overlying Niagara has already been discussed under the latter series on page 333. Attention was called to the fact that in mapping the contact was placed at the top of the Keefer Sandstone and also to the possibility of a few feet of the overlying shales being of Rochester or Clinton age. The lower contact with the White Medina appears, in places, to be transitional, while at others evidence of erosional unconformity is noticeable. In the local area the contact is placed above the grayish-brown to white, quartzitic sandstones that are devoid of any organic remains other than fucoids and **Arthrophycus alleghaniensis.**

FOSSIL LIFE, CLINTON SERIES.

The Clinton Series was found to be sparingly fossiliferous in this area, marine fossils being noted.

CORRELATION, CLINTON SERIES.

Under the heading "General Account," attention has already been called to certain relationships of the Clinton Series as found in Greenbrier County to those of its more northeastern counterparts in Maryland, Pennsylvania, and New York. The **Keefer Sandstone** of Stose and Swartz[3] was named from its occurrence in south-central Pennsylvania and has now been traced southwestward across Maryland and West Virginia. Farther down in the series a thin bed of iron ore occurs, along with shaly and siliceous, fossiliferous limestones, that correlates with the Fossil Ore Horizon of eastern Pennsylvania. In the basal portion of the Clinton in this area there is a prominent red sandstone which attains a thickness of as much as 50 feet. It weathers into rectangular blocks and makes a heavy talus. There is little doubt that this sandstone correlates with the **Iron Sandstone and Block Ore** of Rogers and White, which in turn is synonymous with **Cresaptown Iron Sandstone** of the Maryland Geological Survey. It has also been included with the **Cacapon** by Darton in the Monterey Folio.

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[3]G. W. Stose and C. K. Swartz, Pawpaw-Hancock Folio, No. 179, U. S. Geol. Surv.; 1912.

DESCRIPTION OF MEMBERS, CLINTON SERIES.

UPPER SHALES.

The shales coming above the Keefer and referred to as the **Upper Shales** do not appear to be generally present in Greenbrier County. At most points where the Keefer is exposed the immediately overlying interval is concealed so that their presence can not be definitely proved.

KEEFER SANDSTONE.

The **Keefer Sandstone** was first named by Stose and Swartz[4] from its occurrence in Keefer Mountain, Pennsylvania, a few miles northeast of Hancock, Md., where it forms a thick and massive bed. In Greenbrier County this same member is present, being composed of grayish sandstones that vary from four to eight feet in thickness, often quartzitic in character, and having a total thickness of 35 to 60 feet. This member was noted at several points in the county and can best be seen 0.5 mile west of Alvon.

SHALES AND THIN LIMESTONES.

Between the Keefer Sandstone and the Fossil Iron Ore Horizon there occurs a succession of yellowish-gray to olive, thin shales and platy sandstones with occasional limestones one to six inches in thickness.

FOSSIL ORE HORIZON.

The **Fossil Ore Horizon** was noted at only one locality, that being on Beaver Lick Mountain just south of the position of Cross-Section A—A′ as shown on Map II.

MIDDLE SHALES.

The **Middle Shales** occupy the interval between the Fossil Ore Horizon and Iron Sandstone. These shales vary in color from yellow and olive to green, red, or dark, and attain a thickness of approximately 250 feet. Occasionally calcareous lenses and streaks occur along with thin sandstones.

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[4]Ibid

IRON SANDSTONE.

The **Iron Sandstone** in this area has a deep-red color and consists of quartz grains cemented with hematite. It is often oolitic in texture. The more ferruginous beds resemble a low-grade iron ore but the proportion of silica is entirely too high to permit their use as a source for commercial iron at the present time.

ECONOMIC ASPECTS, CLINTON SERIES.

At certain points in Greenbrier County the Clinton Series contains local deposits of iron ore that are of good enough quality to encourage more thorough prospecting. At no point in fresh exposures was there found ore of minable thickness in the Fossil Ore Horizon, and the Iron Sandstone is too low in ore to be used for this purpose. At some points, however, where the rocks are so folded as to form troughs or basins, there will probably be found better grade ores due to local enrichment from leaching of the higher beds. This will require further prospecting at such points. A further discussion of these ores will appear under their respective headings in Chapter XIII.

Many of the Clinton sandstones are of sufficient hardness to be used as a building stone. The Iron Sandstone breaks into rectangular blocks and is of a pleasing red color so that it is admirably adapted for that purpose.

WHITE MEDINA SERIES.

GENERAL ACCOUNT, WHITE MEDINA SERIES.

The **White Medina Series,** coming just below the Clinton Series and at the top of the three Medinas as recognized in West Virginia, is present in Greenbrier County, being a prominent white quartzite and varying in thickness from 50 to 100 feet. Its greater portion is thick-bedded and carries a siliceous cement so that it is very resistant to weathering and makes prominent ridges. It often contains rounded white quartz pebbles.

TOPOGRAPHIC EXPRESSION, WHITE MEDINA SERIES.

The White Medina, on account of its quartzitic character and massive bedding, is the most resistant to weathering of any rock exposed in the county. Its exposures are always

marked by rugged topography. In the area of its outcrop it is the chief ridge-forming rock and great blocks of the sandstone, which frequently forms the crests of the mountains, break away from the ledge and work by gravity down the steep slopes and frequently conceal the underlying formations.

AREAL EXTENT, WHITE MEDINA SERIES.

On Figure 15, the outcrop of the White Medina can be seen at a glance together with the other Silurian Rocks, while on Map II these same exposures are shown in greater detail and on a larger scale. These exposures are limited to the Browns Mountain Anticlinal area, being confined to Beaver Lick Mountain. Along the crest of Beaver Lick Mountain this sandstone stands at very high angles.

CONTACTS, WHITE MEDINA SERIES.

The upper contact of the White Medina has already been discussed in the description of the Clinton Series. Its base rests upon the red shales and red sandstones of the Red Medina Series. The contact, however, is not so pronounced as would generally be expected between beds so vastly different. The change from red to white is transitional.

FOSSIL LIFE, WHITE MEDINA SERIES.

The White Medina in Greenbrier County, as in other localities, is sparingly fossiliferous. The most abundant species is **Arthrophycus alleghaniensis**, a trail resembling a seaweed, which is often found covering the under-side of these beds with its numerous interlacing "stems." Straight tubular borings occasionally refilled and standing at right angles to the bedding are found and are believed to be the same as similar borings found in the Medina of New York and named **Scolithus verticalis** by Hall. This is one of the characteristic fossils of the White Medina, being widely distributed at this horizon throughout the Appalachian area. In the upper portion of these beds there occurs an abundance of small stem-like, rounded and semirounded forms, that are both single and branching. The surface is smooth and without markings but does not retain a uniform width as in **Arthrophycus alleghaniensis**. These forms, while probably of organic origin, are only classed in general as fucoids.

CORRELATION, WHITE MEDINA SERIES.

The White Medina as recognized in West Virginia and where is has been traced entirely across the State, following the Appalachian counties as it does, has been described under different names in other localities. That it corresponds to the White Medina of the New York and Pennsylvania Surveys appears to be without doubt. The name **Albion** was given it in New York by Kindle[5]. In various Folios of the U. S. Geological Survey it is called **Tuscarora**, named from its outcrop in Tuscarora Mountains in Pennsylvania. In the adjoining State of Virginia and other southern Appalachian States it correlates with the **Clinch**.

ECONOMIC ASPECTS, WHITE MEDINA SERIES.

The White Medina, while very hard and resistant, has not been used as a building stone because it can not be satisfactorily split into blocks. It has been used, particularly in adjoining counties of Virginia, as a base for hard-surfaced roads. It contains a high percentage of silica but its use as a glass-sand has not proved satisfactory because of its conglomeratic character. The white quartzitic members are suited for ganister and should be suitable for various trap-rock uses.

RED MEDINA SERIES.

GENERAL ACCOUNT, RED MEDINA SERIES.

In Greenbrier County the Red Medina Series is exposed only along the west side of Beaver Lick Mountain, outcropping in a small area about 3 miles long by 0.2 mile wide. In this area the rocks have been faulted by overthrusting and the Red Medina is now resting on the crumpled black shales of the Marcellus Series. As is to be expected, the rocks along the fault have been greatly mashed and in the case of the Red Medina, the bedding-planes and direction of dip can be ascertained only with the greatest difficulty. So far as can be told under such circumstances, the Red Medina rocks are composed of alternating red sandstones and red sandy shales.

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[5]E. M. Kindle and F. B. Taylor, U. S. Geol. Survey, Niagara Folio, No. 190; 1913.

One of the surprising things about the Red Medina rocks along the fault is that they have not been fused into quartzites but rather they appear to have been thoroughly disintegrated. Just how much of this disintegration is due to weathering and how much is due to lack of metamorphism is unknown.

As exposed in Greenbrier County, the Red Medina appears to be about 800 feet thick but as pointed out above the bedding is indistinct so that the measurement is really the interval between the fault-plane and the White Medina and may not be the true vertical thickness of the series.

TOPOGRAPHIC EXPRESSION, RED MEDINA SERIES.

Outcropping as they do along the Burr Fault on the west side of Beaver Lick Mountain, the Red Medina rocks can not be spoken of as possessing a type of topographic expression.

AREAL EXTENT, RED MEDINA SERIES.

The Red Medina is exposed only along the west side of Beaver Lick Mountain in an area about 3 miles long by 0.2 mile wide, near the Pocahontas County line as shown on Map II.

CONTACTS, RED MEDINA SERIES.

The upper boundary of the Red Medina with the White Medina has already been discussed in the description of the latter formation, attention being called to the gradual change from one to the other. As the lower limit of the Red Medina, in this area, is a fault-plane, the nature of the contact can not be discussed in a stratigraphic sense.

FOSSIL LIFE, RED MEDINA SERIES.

The Red Medina has been quite generally considered nonfossiliferous and this same condition prevails in Greenbrier County.

CORRELATION, RED MEDINA SERIES.

The Red Medina of Greenbrier County appears to be the same as the **Juniata** of the various Folios of the U. S. Geological Survey. The Juniata is called by the same name in Pennsylvania which is in turn correlated with the **Queenston** of New York. The Juniata and Queenston are believed by some to be the same as the **Richmond** group of Ohio.

The West Virginia Geological Survey has long classified the Red Medina as Silurian and there is considerable evidence to substantiate such a classification[6]. The Pennsylvania and New York Geological Surveys also classify the Juniata and Queenston as Silurian but the Richmond beds are classified (by some) as Ordovician. On the basis of the supposed equivalence of the Red Medina with the Richmond, the U. S. Geological Survey places this series in the Ordovician.

ECONOMIC ASPECTS, RED MEDINA SERIES.

From an economic standpoint, the Red Medina Series in this area is of minor importance, the shales being generally too sandy for brick, while the sandstones are not suitable for building stone.

[6]See Mercer, Monroe, and Summers, Pocahontas, Pendleton, Mineral and Grant, and the Hampshire and Hardy County Reports of the West Virginia Geological Survey.

PART III.

Mineral Resources.

CHAPTER X.

PETROLEUM AND NATURAL GAS.

GENERAL STATEMENT.

In evaluating the chances of finding commercial deposits of petroleum or hydrocarbon natural gas in any area, certain fundamental factors must be taken into account. (1) There must be source beds from which the hydrocarbons may be derived. (2) There must be reservoir beds, in which the hydrocarbons can collect, that will yield these substances in commercial amounts. (3) The source beds and reservoir beds must be near enough to one another that the oil and gas can migrate from the former to the latter. (4) There must be a suitable structure or trap to permit segregation of gas, oil, and water. (5) The degree of metamorphism of the beds must not be too great. All of the above factors must be taken into consideration by the petroleum geologist in the search for new oil and gas pools and each will be considered in turn as to the manner in which it affects Greenbrier County.

(1) Practically all petroleum geologists are now agreed that petroleum and the associated natural gas have been derived from organic matter of vegetable or/and animal origin. Therefore, oil and gas deposits can only be found in regions where source beds contain a sufficient amount of organic matter that is suitable for the formation of these hydrocarbons. There

is a great deal that is not known about what constitutes source beds of petroleum but for the present it may be assumed that adequate source beds are present in Greenbrier County.

(2) The exposed rocks of Greenbrier County show a number of beds that appear to be suitable as reservoir rocks for petroleum and natural gas.

(3) The distance that oil and gas may migrate has been the subject of much debate. The writers are inclined to the view that in most cases the source beds and reservoir beds must be in actual contact at some point but it is conceded that the oil and gas may migrate considerable distances laterally along the beds. It is probable that there are several areas in Greenbrier County that meet this requirement.

(4) There are several structures in Greenbrier County that appear to be suitable for the accumulation of oil and gas. In addition to anticlinal structures, oil and gas are often trapped in sand lenses that are sealed updip by pinching out of the permeable rock. Judging from the outcropping rocks such traps may be expected in Greenbrier County.

(5) Commercial oil and gas deposits are never found in highly metamorphosed rocks. In nature all gradations between unmetamorphosed sedimentary rocks and their metamorphosed equivalents are found. Since commercial deposits of oil are found in the former and never in the latter it is apparent that somewhere in between there must be a zone where the degree of metamorphism has been sufficient to destroy or dissipate any oil or gas that may have been present. White has pointed out that the zone between 62 and 65 per cent. fixed carbon ratio in coal may be considered the extinction zone for the occurrence of commercial deposits of oil but natural gas may be found in areas that have suffered more advanced metamorphism[1]. As shown in the Table of Coal Analyses published at the end of Chapter XI, the coals of Greenbrier County all show more than 70 per cent. fixed carbon when calculated on a moisture and ash free basis. This would seem to eliminate Greenbrier County as prospective

[1]White, David, Metamorphism of Organic Sediments and Derived Oils; Bull. Amer. Assoc. of Petroleum Geologists, Vol. 19, p. 592; 1935.

of territory. A fact that is difficult to explain under David White's theory is that the percentage of fixed carbon in the coal of individual coal beds increases from east to west in Greenbrier County.

There is one other factor that should be given careful consideration. That factor is the distribution of oil and gas in the State as a whole. The oil pools nearest Greenbrier County are about 30 miles to the northwest, in Clay and Kanawha Counties. Gas has been produced somewhat nearer the boundaries of Greenbrier County, the commercial production in Fayette and Nicholas Counties being only 16 to 20 miles west or northwest of the county line. What is much more encouraging is the fact that gas has been found near Bozoo (Chestnut Hill) in Monroe and Summers Counties where the rocks are more severely metamorphosed than are the rocks in western Greenbrier County. Wells drilled much nearer Greenbrier County in Nicholas, Fayette, Summers, and Monroe Counties have found shows of natural gas but no oil.

From the foregoing discussion it is seen that the chances of finding oil in Greenbrier County are very slight but there does seem to be some chance of finding natural gas.

PROSPECTIVE OIL AND GAS AREAS.

There are four areas in western Greenbrier County in which closures probably exist on subsurface beds. (1) Judging from surface exposures there is a small closure on the south end of the Webster Springs Anticline. As shown by the green contours on Map II, this "dome" is located about 3 miles north of Anjean and 2 miles west of Duo. It is possible that this "dome" is tilted enough with depth, due to the convergence of the Mississippian beds, to eliminate the northeast closure on all beds below the base of the Greenbrier Limestone.

(2) About one mile south of Mann Knob in Williamsburg District there is another closure on the same anticline. The closure is not readily apparent from the green contours but here the convergence of the underlying beds will greatly increase the closure on each successively lower horizon.

(3) In the vicinity of Cold Knob it is reasonably certain that there is a structural closure on the subsurface horizons.

Structure contours on the Sewell Coal horizon fail to show a closure but a small closure is present on the Princeton Sandstone. Here, too, the convergence of the underlying beds will increase the closure on each successively lower horizon.

(4) From a structural standpoint, the most favorable area for gas production in Greenbrier County is on Brushy Ridge. This topographic feature coincides with the Williamsburg Anticline and the surface rocks show a closure, in all directions, of at least 1,000 feet. The cross-section of this structure is clearly shown on Cross-Section D—D′ printed on the margin of Map II. The narrow crest and steep sides of this structure may make the drilling of a straight hole difficult.

The area east of the Greenbrier River can be eliminated as prospective oil and gas territory because all of the horizons known to be productive in West Virginia either outcrop at the surface or have been removed from the area by erosion.

PROSPECTIVE OIL AND GAS HORIZONS.

In the area under discussion the known productive sands cf the Monongahela, Conemaugh, Allegheny, and upper Pottsville Series do not now exist, as they belong above the youngest remaining formations. Small areas of rocks of the middle and lower Pottsville Series remain but in their present position they may be definitely eliminated from prospective oil and gas horizons. In the Mauch Chunk Series the upper and middle portions outcrop widely and offer little hope of oil or gas. In the lower portion occur the Droop and Webster Springs Sandstones that offer slight possibilities of production in areas 1 and 2 described above.

The Greenbrier Series, or Big Lime of the drillers, probably has a thickness of 400 feet in western Greenbrier County. At the outcrop, this series contains several oolitic layers, as described in Chapter VII. The oolitic beds might serve as reservoir beds and production is possible from these horizons in areas 1, 2, and 3 as outlined above. In a well drilled near Lookout, Fayette County, a good show of gas and several separate salt water horizons were found in this series. (See record of well No. 6 published on a suceeding page of this Chapter.)

The Pocono Series, which occurs just below a protective mantle of red shales (Maccrady), contains several coarse sandstone beds interbedded with shales, that would appear to be good reservoir beds. It is from sands of this horizon that a considerable quantity of gas was found in the Wills and Johnson wells of Monroe County, and the Shumate well of Summers County. The records of these wells are published on subsequent pages of this Chapter. It is possible that production will be found at this horizon. These horizons outcrop at the surface or are very near the surface in area number 4.

There are several sandstones in the Upper Devonian that appear to be suitable for reservoir beds. It is possible that production will be secured from these horizons.

The Middle Devonian is mainly composed of black shale in Greenbrier County. Devonian beds of a similar character are producing commercial quantities of gas in southwestern West Virginia.

The Oriskany Series of the Lower Devonian has recently become a valuable gas producing horizon in the West Virginia area. The Ridgeley Sandstone is producing great volumes of gas in Kanawha County and the Huntersville Chert is producing gas in Fayette County, Pennsylvania, near this State's northern boundary. It is the Ridgeley Sandstone that appears to be the most promising horizon for production in Greenbrier County.

The Helderberg Series coming next below the Oriskany contains two sandstones (Healing Springs and Clifton Forge) that appear to be suitable as reservoir beds. Any well drilled to the Oriskany in the Greenbrier area should not be abandoned without testing these horizons.

The Silurian rocks in Greenbrier County outcrop along the Browns Mountain Anticline in a broken and greatly mashed condition so that the evaluation of the various beds as prospective horizons for gas (or oil) is very difficult. In western Greenbrier County the Keefer and White Medina Sandstones may be porous enough to serve as reservoirs for fluids.

Table Showing the Estimated Depths to Geologic Horizons at Various Points in Greenbrier County.

Geologic Horizon	3 Mi. N. of Anjean.	1. Mi. S. of Mann Knob.	Cold Knob.	Alta.	Russellville.	County Line, N. F. Cherry River.
Greenbrier Series (Top)	2,300	1,450	1,450	....	1,550	1,300
Greenbrier Series (Base)	2,725	1,875	1,925	....	1,930	1,700
Pocono (Base)	3,050	2,175	2,200	300	2,400	2,000
Oriskany Series (Top)	8,250	7,650	7,800	5,800	6,750	7,600
Helderberg (Base)	8,650	8,050	8,200	6,200	7,150	8,000
White Medina (Top)	9,950	9.350	9,450	7,450	8,500	9,400

In the above table the wells at the localities noted are assumed to start at the following horizons:

Well 3 miles north of Anjean, Sewell Coal.
Well 1 mile south of Mann Knob, top of Mauch Chunk.
Well near Cold Knob, top of Princeton Sandstone.
Well near Alta, 100 feet below the top of Pocono.
Well near Russellville, 150 feet below Sewell Coal.
Well near the county line on North Fork of Cherry River, top of Princeton Sandstone.

Several samples of the Lower Devonian and Upper Silurian sandstones were collected by the writers in connection with the preparation of this report. These samples were collected for comparison with drill cuttings from the same horizons taken from wells in various parts of the State. The samples were examined by Professor Martens and those familiar with the work of Dr. Martens will be interested in the following table of mineral identifications:

Mineralogy of Lower Devonian and Upper Silurian Sandstones in Greenbrier and Pocahontas Counties, W. Va.

(Mineral Identifications by J. H. C. Martens).

Sample No.	HEAVY									LIGHT				Formation
	Pyrite	Zircon	Rutile	Leucoxene	Brown Tourmaline	Green Tourmaline	Blue Tourmaline	Authigenic Tourmaline	Monazite	Quartz	Authigenic Quartz	Feldspar	Glauconite	
Alvon Section.														
1M		C	VS	VA	C			S		VA			A	Huntersville
2M		C	S	VA	C	C			VS	VA	C	S		Ridgeley
3M		A	S	A	C		S	S		VA		VS		Ridgeley
4M		VA	S	C	C	C	VS		VS	VA				Ridgeley
5M		A	VS	C	A	C	VS	C	VS	VA				Healing Springs
6M		A	S	C	A	S	S	A		VA				Healing Springs
7M		A	S	A	C	S	S	S	VS	VA				Healing Springs
8M		A		A	A	S	S	C		VA				Clifton Forge
9M		C		C	VA	S	S	C		VA				Clifton Forge
10M		S		C	A	S		C		VA	C			Clifton Forge
11M		S		C	VA		S	C		VA				Keefer
12M		VA	VS	C	A	S	S	A		VA				Keefer
13M		C		C	A	C	S	C		VA	C			Keefer
14M		C	VS	A	A	S		S		VA	A			Keefer
15M	C	C	S	A	A	C	S	C		VA	A			Keefer
16M		C		C	VA	S	S	A		VA	C			Keefer
17M		C		C	VA	S	S	A		VA	A			Keefer
18M	C	C		C	VA	S	S	A		VA	C			Keefer
19M	C	A		C	A	C	S	C		VA	C			Keefer
20M					VA		A			VA	A			Keefer
21M	S	C		C	VA	C	S	A		VA	A			Keefer
Burr Valley Section.														
1M	S	A	S	A	C				S	A		C	A	Huntersville
2M	VA	C		C					VS	VA		S		Ridgeley
3M		A	S	A	C	S	S	C		VA	A	C		Ridgeley
4M		A	S	A	C	S	S	C		VA	C			Ridgeley
5M		A	S	A	C	S	S	C		VA	C	S		Ridgeley (?)
Bobs Ridge Section.														
1M		A		A	C	S		C		VA	A			Healing Springs
2M		A	S	A	C	S		C		VA	A			Healing Springs
3M		A		A	C	S		C		VA	A			Healing Springs
4M		A	S	A	C	S		C		VA	A			Healing Springs
5M		C	S	A	A	C	S	A		VA	A			Healing Springs
6M		A	S	A	A	C		A		VA	A			Healing Springs
7M		A	S	A	A	C	S	A		VA	A			Healing Springs
8M		A	S	A	A	C		A		VA	A			Healing Springs

Key.

VA—Very abundant C—Common VS—Very scarce
A—Abundant S—Scarce.

The amounts of heavy minerals in the table are relative to the total heavy fraction and not to the rock as a whole, since the amount of heavy minerals in each of the samples is very small.

WELL RECORDS.

In Greenbrier County five wells have been drilled in search of oil or gas, none of which obtained production. Three shallow wells were drilled north of Sam Black Church, one of which may have reached the Greenbrier Limestone (Big Lime). The records of these wells **(Nos. 1, 2, and 3 on Map II)** could not be found, but it is reported that the deepest well (No. 2) reached a depth of 1,600 feet. No. 1 reached a reported depth of 800 feet but the total depth of No. 3 is unknown.

The record of the **S. W. Hinkle well (No. 4 on Map II)**, drilled about one mile north of Trout P. O., reached a total depth of 1,600 feet. This well penetrated 400 feet of the Chemung beds. The well is unfavorably located from a structural standpoint as it is in the syncline between the "dome" at Cold Knob and the Williamsburg Anticline. In 1936 the drilling machine was still setting at the location of this well and an artesian flow of fresh water was emerging between the 8- and 10-inch casings. The source of the water is probably the Droop or Webster Springs Sandstone. The record of this well is published in Chapter V, pages 180-1, in connection with the Cold Knob—Hinkle Well Section.

So far as known to the writers, only one other test well for oil or gas has been drilled in Greenbrier County. This well **(No. 5 on Map II)** was located on the east side of the Greenbrier River, 1.5 miles northeast of Anthony. Located just east of the axis of the Caldwell Syncline, the well was drilled at a structurally unfavorable position. The formations shown in the log of the well outcrop along Anthony Creek a short distance to the east of the well. The well log is as follows:

S. M. Jones Well—No. 5 on Map II.

Falling Springs District; on east side of Greenbrier River, 1.5 miles northeast of Anthony and 0.38 mile southeast of mouth of Laurel Run; drilled in 1913 by South Penn Oil Co.; elevation, 1810-15′ (by topo. contour).

	Thickness. Feet.	Total. Feet.
Wooden conductor	9	9
Slate	11	20
Lime, (Berea)	30	50

	Thickness. Feet.	Total. Feet.
Red rock (Top of Catskill)	2	52
Red sand	48	100
White slate	5	105
Red sand	45	150
Sandy lime	70	220
White slate	5	225
Sandy lime	15	240
Slate and shells	15	255
Sandy lime	20	275
Break	2	277
Sandy lime	17	294
Slate	6	300
Lime	10	310
Red rock (Base of Catskill)	15	325
Lime	15	340
Sandy lime (**Hendricks**)	30	370
Black slate	8	378
Lime	6	384
Slate	3	387
Lime	13	400
Sandy lime	35	435
Slate	15	450
Lime	25	475
Slate	4	479
Lime	21	500
Sandy lime	60	560
White slate	15	575
Lime	25	600
Slate	25	625
Sandy lime	20	645
Slate and shells	35	680
Sandy lime	40	720
Slate	13	733
Slate and shells	17	750
Lime	40	790
Slate	10	800
Sandy lime	45	845
Slate	40	885
Lime	40	925
Slate and shells	75	1000
Lime	40	1040
Slate	20	1060
Lime	30	1090
Slate	20	1110
Lime	160	1270
Slate and shells	40	1310
Lime	15	1325
Slate	25	1350
Lime	50	1400
Slate and shells	40	1440
Slate	30	1470
Lime	80	1550
Sandy lime	50	1600
Lime	40	1640

	Thickness. Feet.	Total. Feet.
Sandy lime	50	1690
Lime	35	1725
Slate	145	1870
Black lime	50	1920
Slate	30	1950
Slate and shells	75	2025
Slate	35	2060
Slate and shells	40	2100
Sandy lime	20	2120
Slate	70	2190
Sandy lime	15	2205
Slate and shells	45	2250
Lime	50	2300
Slate	50	2350
Slate and shells	25	2375
Lime	25	2400
Sand	20	2420
Slate	15	2435
Lime	15	2450
Slate	15	2465
Lime	25	2490
Slate and shells	30	2520
Slate	20	2540
Total depth		2540
Total depth (steel-line measurement)	......	2575

The following is the record of a well drilled near Lookout, Fayette County. This well is of particular interest in that it illustrates the possibility of several producing horizons within the Greenbrier Series. The well is located rather far down on the plunging end of the Mann Mountain Anticline, which perhaps accounts for the salt water. The fact that salt water was found proves the presence of reservoir beds in this series. The presence of an estimated flow of 300,000 cu. ft. of gas is also of interest. The carbon ratio of the Sewell Coal at Lookout is slightly higher than the carbon ratio of the Sewell Coal in Greenbrier County:

John Nuttall Estate No. 1 Well—No. 6 on Map II.

Fayette County, Nuttall District; authority, Joseph H. Holmes; on Keeney Creek, at Lookout, near mouth of Lookout Mine of Lookout Coal & Coke Company; completed, May 13, 1926, after one movement of rig; elevation, 2257′ B. 13″ casing, 36′; 10″, 260′ (pulled 240′); 8″, 1370′ (pulled); 6⅝″, 1830′ (pulled 79 joints; 6 joints left in); $5\frac{3}{16}$″, 2095′ (pulled). Show of gas at 1900-1910′, estimated 300,000 cu. ft. Gas drowned out by water but when casing was pulled the gas showed considerable pressure. Well plugged.

	Thickness. Feet.	Total. Feet.
Pottsville Series (825′+)		
Soil and clay	47	47
Lime shell	3	50
Coal, Sewell (2210′ B., in mine)	3	53
Slate	67	120
Lime, sandy, very hard	4	204
Slate	43	247
Sand and lime	63	310
Slate	35	345
Lime and slate	113	458
Coal, Fire Creek	7	465
Slate	10	475
Fire clay	6	481
Lime and slate	344	825
Mauch Chunk Series (990′)		
Red rock	20	945
Lime, black	30	975
Slate, white	10	985
Red rock	185	1170
Lime	3	1173
Red rock	102	1275
Lime shell	15	1290
Slate	12	1302
Lime, sandy	8	1310
Slate	2	1312
Lime, gritty	2	1314
Slate	2	1316
Lime	8	1324
Slate	16	1340
Lime shell	5	1345
Slate	13	1358
Lime shell	2	1360
Sand (water, 1393′)	35	1395
Red rock	10	1405
Lime	30	1435
Red rock	10	1445
Lime	30	1475
Sand, Maxton (?)	50	1525
Slate	10	1535
Red rock	15	1550
Slate	18	1568
Little Lime	12	1580
Slate	8	1588
Sand, white	8	1596
Slate	4	1600
Lime, sandy, white	56	1656
Slate	44	1700
Slate and shells	90	1790
Lime	9	1799
Pencil Cave	16	1815
Greenbrier Series (371′)		
Big Lime, black (gas, 1868′, quite a puff but lasted only short time; gas, 1900-1910′)	100	1915
Big Lime, white	100	2015

	Thickness. Feet.	Total. Feet.
Big Lime, light-gray, sandy	2	2017
Big Lime, light-gray, sandy, (salt water)	13	2030
Big Lime, white	57	2087
Big Lime, red (salt water)	4	2091
Big Lime, white	19	2110
Big Lime, red	12	2122
Big Lime, white	64	2186
Pocono Series (507′)		
Sand, **Big Injun**	81	2267
Sand, **Squaw**	43	2310
Slate, gray	7	2317
Shale and slate	23	2340
Slate, sandy	85	2425
Slate, **Weir**	18	2443
Slate, sandy	82	2525
Sand, soft, **Weir**	5	2530
Slate, sandy	97	2627
Sand, **Weir**	15	2642
Slate and shells, blue	22	2664
Slate and lime shells	18	2682
Slate, black, Coffee	6	2688
Sand, **Berea**	5	2693
Chemung Series (115′+)		
Slate, sandy, blue	12	2705
Slate and shells	103	2808

The record of the **J. H. Gwinn No. 1 Well (No. 7 on Map II)** is published in connection with the Green Sulphur Springs Section in Chapter V. page 195. The well was drilled near the town of Green Sulphur Springs, Summers County. Several shows of gas were reported from horizons in the Pocono and Chemung Series. The well was not located in a favorable structural position.

The record of the **Gauley Coal Land Company (Granville O'Dell) No. 1 Well (No. 8 on Map II)** is published in connection with the Hominy Falls Section in Chapter V, pages 177-8. This well, drilled 1.4 miles south of Hominy Falls, Nicholas County, was abandoned as a dry hole. The well was not located in a favorable structural position.

The following is the record of a well drilled near Johnson Crossroads, Monroe County. The well is located west of the axis of the Abbs Valley Anticline. It is reported that one of the reasons the well was abandoned was because of salt water coming along with the gas. The well may have been located too low on the structure:

L. E. Johnson et al. No. 4209 Well.

Monroe County, Wolf Creek District; 0.3 mile northeast of Johnson Crossroads; 3.1 miles W. of 80° 35′ and 3.3 miles S. of 37° 40′, Alderson Quadrangle. By United Fuel Gas Company, Charleston, W. Va. Rig commenced March 25, 1930; completed March 29, 1930. Drilling commenced April 15, 1930; completed October 17, 1930. Drilled by Drilling Dept. of Company; drillers, B. J. Dotson and W. H. McClane. 13½″ casing, 287′ (left in); 10″, 671′; 8¼″, 1578′. Shot, October 7, 1930, with 40 qts. Shot exploded by tools, 1562-1572′. Test before shot 12/10 W. in 1″=42,000 cu. ft. Test after shot 12/10 W. in 1″=42,000 cu. ft. 1—10″ Star rimmer, 1—10″ Wing Sub, and 1—8¼x10x13 B. H. packer left in hole.

Well plugged and abandoned October 17, 1930.
Starts about 300′ below top of Greenbrier Series.
Elevation, 1904′ B.

	Thickness. Feet.	Total. Feet.
Greenbrier Series (1038′+)		
Clay, yellow, soft	12	12
Lime, black, hard	298	310
Sand, red, soft	5	315
Lime, black, hard	677	992
Lime, gray, hard	46	1038
Maccrady Series (173′)		
Sand, red, soft	12	1050
Lime, gray, hard	25	1075
Shale, red, soft	136	1211
Pocono Series (426′+)		
Sandy lime, blue, soft (10/10 W. in 1″=37,680 cu. ft. gas, at 1230-35′)	49	1260
Slate, white, soft	5	1265
Sand, gray, hard	35	1300
Lime, white, hard	68	1368
Slate, black, soft	16	1384
Coal, black slate with some coal	6	1390
Lime shell	50	1440
Sand	106	1546
Slate	4	1550
Sand	38	1588
Lime	7	1595
Unrecorded to bottom (steel-line measure)	42	1637

The following two records are of wells drilled near Bozoo (Chestnut Hill), Monroe County. Both wells found gas in the Pocono Series:

John T. Shumate No. 1 Well.

Summers County, Forest Hill District; by The Bozoo Company; on Crooked Run of New River, 0.6 mi. N. E. of Neponset; well was completed September 2, 1929; Contractors, Dunham & Titus; elevation,

2040′ B. Gas test, 2,500,000 cu. ft. Rock pressure, 635 lbs. in 30 min. in 8¼″ casing, after which well was opened and allowed to flow into Wills well at Bozoo.

		Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Hinton Group (50′+)			
Surface soil and loose sandstone		12	12
Sandstone, gray (small amount of water at 20′ 13′	Stony Gap		
Sandstone, grayish-white 25	Sandstone	38	50
Mauch Chunk Series—Bluefield Group (1235′)			
Shale, red and brown		110	160
Limestone, bluish-gray, shaly		10	170
Shale, reddish-brown or gray		130	300
Shale, gray, calcareous		25	325
Shale, reddish-brown, sandy		55	380
Limestone, gray, shaly		20	400
Shale, gray, calcareous		62	462
Shale, red		28	490
Shale, gray		128	618
Shale, dark-gray		4	622
Sand, grayish-white		53	675
Shale, soft, gray		2	677
Sandstone, Droop, grayish-white		65	742
Shale, dark-gray, calcareous		108	850
Shale, brownish-gray		10	860
Shale, gray, sandy		40	900
Shale, gray, sandy and calcareous		50	950
Limestone, **Glenray**, dark-gray, shaly		53	1003
Shale, gray, soft 52′			
Shale, gray, soft 10	Lillydale		
Shale, gray, soft, calcareous 145	Shale	257	1260
Shale, dark-brown, soft 50	(Pencil Cave)		
Sandstone, **Edray**, dark-gray, shaly, impure		25	1285
Greenbrier Series (1375′)			
Limestone, gray 25′	Alderson		
Limestone, dark-gray 90	Limestone	250	1535
Limestone, bluish-gray 135			
Limestone, gray, hard, sandy 30′			
Limestone, dark-gray 110	Union		
Limestone, light-gray 75	Limestone	380	1915
Limestone, gray 100			
Limestone, light-gray 65			
Limestone, dark-gray, shaly 100′			
Limestone, light-gray 10	Pickaway		
Limestone, light-gray 65	Limestone	385	2300
Limestone, gray, shaly 10			
Limestone, dark-gray 200			
Limestone, **Taggard**, gray, shaly		100	2400
Limestone, bluish-gray 120′	Patton		
Limestone, gray, hard 20	Limestone	140	2540
Limestone, **Sinks Grove**, dark, bluish-gray		120	2660
Maccrady Series (160′)			
Shale, gray		25	2685
Shale, gray, very soft		10	2695

		Thickness. Feet.	Total. Feet.
Shale, gray, sandy and calcareous		35	2730
Shale, reddish-brown and gray		90	2820
Pocono Series (103′)			
Sandstone, gray, calcareous 30′	Squaw Sand?	103	2923
Shale, bluish-gray 20			
Limestone, bluish-gray, shaly 10			
Shale, dark, soft, sandy 5			
Sandstone, gray, shaly 31			
Sandstone, dark-gray, with quartz pebbles (gas, 2916-2923′) 7			
Total depth			2923

G. K. Wills No. 1 Well.

Monroe County, Red Sulphur District; by The Bozoo Company; on New River plateau and axis of Abbs Valley Anticline, 0.5 mi. S. W. of Bozoo (Chestnut Hill); completed, February 21, 1929; drilled by L. H. Harrison et al.; Contractor, C. M. Means; elevation, probably somewhat less than 2100′. Shot, February 9, 1929, with 140 qts., at 3097-3129′, with no increase in gas. Shot, February 14, 1929, with 40 qts., at 649′; Packer set above lower pay sand but leaks and gas comes from this sand up into upper sand. A rock pressure reading under this condition showed 215 lbs. After allowing the well to blow off 17 hrs. and 45 min., gas test at 649′ was 82,000 cu. ft.; at 3105′, was 157,000 cu. ft. per day.

	Thickness. Feet.	Total. Feet.
Mauch Chunk Series—Hinton Group (30′+)		
Loose sandstone rocks	30	30
Mauch Chunk Series—Bluefield Group (1250′)		
Shale, bluish-gray and reddish	26	56
Shale, greenish-gray (water at 70′)	16	72
Shale, reddish-brown	6	78
Sandstone, red, fine-grained	7	85
Shale, gray	9	94
Shale, reddish-brown	9	103
Sandstone, light greenish-gray, fine-grained, compact	4	107
Shale, green and dark-green, containing some organic matter	33	140
Shale, reddish-brown	33	173
Sandstone, gray	4	177
Shale, red, platy, with conspicuous mica flakes	51	228
Shale, hard, slaty	12	240
Shale, reddish-brown	5	245
Shale, greenish-gray	35	280
Shale, dark-gray, sandy	22	302
Sandstone, greenish-gray, shaly	18	320
Shale, dark-gray	10	330
Shale, greenish-gray	25	355
Sandstone, gray, shaly	12	367
Shale, dark-gray, sandy	36	403
Limestone, gray, shaly	6	409
Shale, gray, sandy	31	440

		Thickness. Feet.	Total. Feet.
Shale, red		25	465
Shale, greenish-gray		20	485
Shale, red		4	489
Shale, gray, sandy		79	568
Shale, dark, canbonaceous, limy		10	578
Shale, gray, sandy		5	583
Shale, dark, slaty, pyritic		2	585
Shale, gray, sandy		5	590
Sandstone, white, coarse-grained		1	591
Shale, dark-gray		6	597
Sandstone, gray (gas, 649′=82,000 cu. ft.)		73	670
Shale, black		1	671
Sandstone, white, quartzitic 19′	**Droop Sandstone**	50	721
Sandstone, white, intermingled with black shale 31			
Shale, dark-gray		24	745
Shale, grayish-black, sandy		73	818
Shale, dark-gray, limy		24	842
Shale, dark-blue, limy, with calcite crystals		28	870
Shale, gray, soft, sandy		17	887
Limestone, **Reynolds**, bluish-gray, soft, sandy		37	924
Sandstone, **Webster Springs**, gray, compact, carrying some muscovite		16	940
Shale, dark-blue, limy, with calcite crystals		87	1027
Shale, soft		4	1031
Limestone, gray, sandy 9′	**Glenray Limestone**	20	1051
Sandstone, gray, impure 5			
Limestone, bluish, soft, impure 6			
Shale, gray, limy		56	1107
Shale, blue, platy, slightly limy 123′	**Lillydale Shale** (Pencil Cave)	173	1280
Shale, dark-blue, soft, platy 50			

Greenbrier Series (1480′)

		Thickness. Feet.	Total. Feet.
Shale, bluish-gray, limy 25′	**Alderson Limestone**	136½	1440
Shale, dark, bluish-gray, slightly limy 25			
Limestone, dark-gray, soft 86½			

NOTE: 1339 on sand line=1362½ on steel measuring line. All measurements corrected from here on. Error on sand line probably cumulative.

		Thickness. Feet.	Total. Feet.
Shale, **Greenville**, dark-blue, gray, slightly limy		60	1500
Limestone, blue-black, composed of rounded dark granules in a light-colored ground-mass, (oolitic texture) 80′	**Union Limestone**	285	1785
Limestone, bluish-gray, platy, shaly 110			
Limestone, gray 95			

		Thickness. Feet.	Total. Feet.
Limestone, dark, bluish-gray, impure ... 90′ Limestone, bluish-black, oolitic ... 112 Lifestone, gray, compact, probably somewhat shaly ... 43 Shale, gray, limy, and sandy ... 30 Limestone, gray, shaly ... 40 Limestone, bluish-gray, dark, impure ... 45 Limestone, bluish-gray ... 55 Limestone, bluish-gray ... 62	Pickaway Limestone	477	2262
Limestone, gray, siliceous; traces of brachiopods ... 28′ Limestone, gray, shaly ... 30	Taggard Limestone	58	2320
Limestone, dark-gray, hard ... 47′ Sandstone, gray, fine-grained, somewhat limy ... 23 Limestone, gray, shaly ... 28 Sandstone, bluish-gray, fine-grained, shaly, somewhat limy ... 67 Limestone, gray, hard, oolitic; exterior composed of concentric calcite layers ... 25	Patton Limestone	190	2510
Limestone, dark-blue, almost black, impure ... 80′ Limestone, gray, hard, sandy ... 16 Shale, bluish-gray, limy ... 10 Shale, dark, bluish-gray, limy and sandy ... 9 Limestone, dark-gray and light-gray, compact ... 29 Shale, slate-gray, sandy and somewhat limy ... 8 Limestone, dark-gray, impure ... 25	Sinks Grove Limestone	177	2687
Limestone, gray, very sandy (should probably be called a shaly, limy sandstone) ... 7′ Sandstone, dark-gray, fine-grained, shaly and limy ... 8 Limestone, gray, shaly ... 36 Shale, gray, and black, limy shale; fragments composed of quartz in minute grains with conchoidal surfaces ... 5 Limestone, dark-gray, sandy ... 7 Limestone, grayish-white, sandy ... 10	Hillsdale Limestone	73	2760
Maccrady Series (180′)			
Shale, gray; with quartz as above in ¼″ lenses ...		28	2788
Quartz, chiefly, with some gray shale (quartz in columnar grains larger than above with conchoidal surfaces) ...		22	2810

Note: 2796 on sand line = 2806½ on steel measuring line, probably cumulative error. Corrected measurement from here on.

		Thickness. Feet.	Total. Feet.
Shale, purple-red with ¼" to ½" quartz lenses (little gray shale)		30	2840
Sandstone, gray, fine-grained, shaly; or sandy shale....		15	2855
Shale structures, gray, hard, which resemble slickensides; pyrite disseminated throughout		45	2900
Shale, purple-red (little gray shale)		40	2940
Pocono Series (410')			
Sandstone, well cemented, medium-grained (quartz, with a little muscovite) .... 8'			
Sandstone, dark-gray, fine-grained (containing a little calcite)........38			
Shale, hard, gray (with pyrite disseminated throughout); probably contains some quartz grains; slickensided surfaces........15			
Shale, gray, sandy; and sandstone, gray, coarse-grained, with conspicuous muscovite........13	Squaw Sand?..	74	3014
Shale, dark-gray, limy (with some gray, fine-grained sandstone, some pyrite, and little slickensided coal)		3	3017
Shale, carbonaceous; and coal, hard, slickensided; horizon of Merrimac Coal?		5	3022
Sandstone, grayish-white, coarse-grained ....38'			
Sandstone, gray, coarse-grained........24			
Sandstone, gray, compact, with muscovite 19			
Shale, gray and reddish, with scattered grains of quartz; and sandstone, gray, with muscovite, a pebbly conglomerate (gas at 3105')....12			
Sandstone, gray, with muscovite and little veined dolomite........42			
Sandstone, chiefly, gray, compact, with muscovite; some slickensided, dark shale with a few dolomite veins........23			
Sandstone, bluish-gray; and sandy shale 68	Broad Ford Sandstone	226	3248
Shale, Sunbury? (Coffee Shale), bluish-gray, sandy......		12	3260
Sandstone, gray, fine-grained; and dark bluish-gray shale........17'			
Sandstone, light-gray, shaly........ 3			
Sandstone, chiefly, dark-gray, fine-grained; with some shaly sandstone 35			
Some sandstone, gray, fine-grained but chiefly bluish shale........35	Berea Sandstone	90	3350
Chemung Series (172'+)			
Sandstone, bluish-gray, fine-grained; with brachiopod fragments		5	3355
Sandstone, chiefly, gray and fine-grained, or bluish-gray		44	3399

	Thickness. Feet.	Total. Feet.
Sandstone, gray, fine-grained; and dark-colored sandy shale	26	3425
Sandstone, chiefly, reddish, fine-grained and platy, but some dark-colored and platy	10	3435
Sandstone, chiefly, gray and fine-grained; some gray shale with scattered quartz grains	15	3450
Shale, blue-black, platy	14	3464
Sandstone, grayish-white	27	3491
Shale, blue-black	2	3493
Note: 3493′ on sand line=3496½ on steel measuring line	......	3496½
Sandstone, light-gray, well cemented	5½	3502
Shale, slate-blue, chiefly, with 5% of light-gray well cemented sandstone which appears to occur as small lenses in the shale; little pyrite	20	3522
Total depth	......	3522

SUMMARY OF OIL AND GAS POSSIBILITIES IN GREENBRIER COUNTY.

Is it worth while to prospect for oil or gas in Greenbrier County? The answer to this question, for that portion of the County east of the Greenbrier River, is no. To answer this question for the western part of the County is not so easy. The answer largely depends upon two things; namely, source beds and the degree of metamorphism necessary to destroy or dissipate oil and gas. These factors have been discussed on an earlier page of this Chapter, where it was pointed out that source beds are probably present and while the chances of finding oil are very small, there is some chance of finding commercial quantities of natural gas.

From the standpoint of the petroleum geology of West Virginia as a whole, Greenbrier County is considerably farther east than any commercial oil or gas pool thus far discovered. While this fact does not necessarily condemn the territory, it does suggest that the search for gas in this county should be left to those that can afford to lose.

CHAPTER XI.

COMMERCIAL COAL.

INTRODUCTION.

In Chapter VI a systematic description of all the coal seams found in Greenbrier County has been given, together with their correlations. Many of the beds are too thin, lenticular, or impure to be of commercial rank and all such have been fully described in the Chapter named. In the present Chapter numerous measured sections for those coals that are of minable thickness and purity, with estimates of their probable tonnage, and etchings showing their areal extent are given.

In this county there appear to be six coals that have minable thickness and 24 others that are too thin, impure, or irregular to be of more than local value, some of these latter being thin beds that are of scientific interest only. The minable seams in descending order are the Sewell, Little Raleigh, Beckley, and Fire Creek of the New River Group; and the No. 6 Pocahontas and No. 3 Pocahontas of the Pocahontas Group; all in the Pottsville Series.

Figure 16 shows the different coal seams of the county, giving not only their thickness but also the average interval (base to base) between them. Figures 17, 19, 20, 21, and 23 show approximately where the commercial seams occur in possible minable thickness in the county.

In general, these coals are semibituminous, those northeast of Beech Ridge being on the dividing line in chemical composition between semibituminous and bituminous and those in the southwest part of the county approach the semianthracite classification.

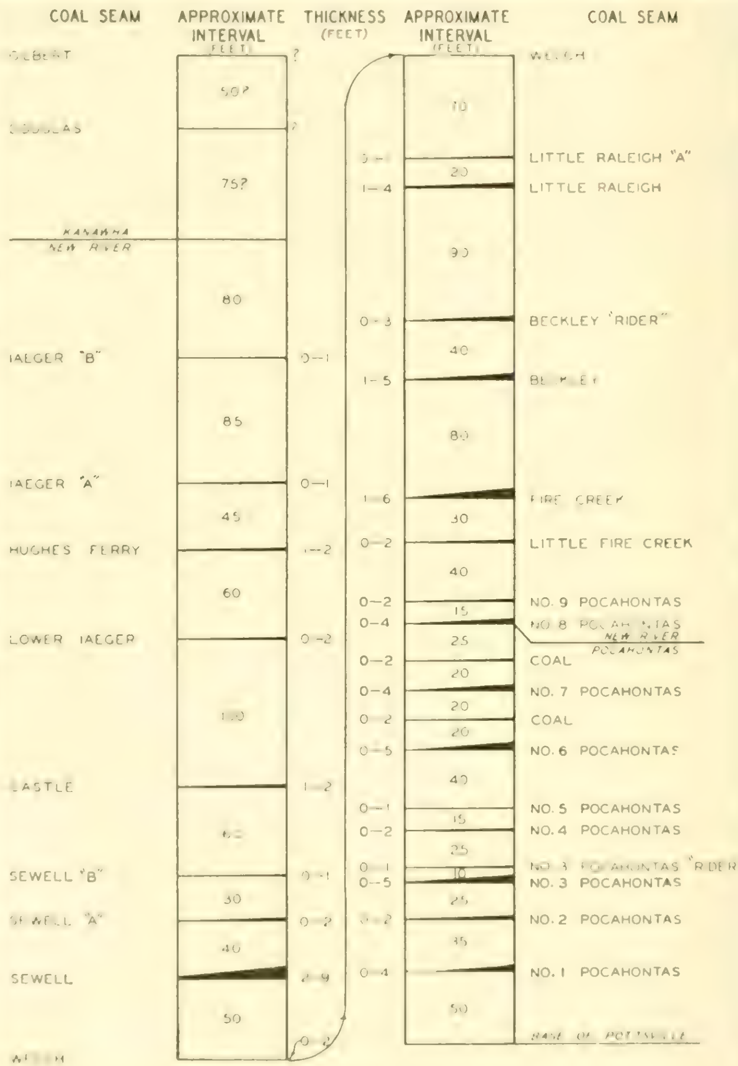


FIGURE 16

DIAGRAM SHOWING THE POSITION AND THICKNESS OF COAL SEAMS IN GREENBRIER COUNTY

The coals are variously used for steam and domestic fuel, for metallurgical purposes and for mixing with higher volatile coals to produce gas and by-product coke. Owing to their low ash and sulphur content, their low volatile content and the ease with which they may be crushed, the coals of Greenbrier County would be especially well adapted for use in mechanical stokers or for powdered fuel.

STATISTICS OF COAL PRODUCTION.

Commercial coal mining has been practiced in Greenbrier County for many years, the first record of production being in 1907; the record of mining being continuous from that year to date.

So far as the records of the Department of Mines show, the Lost Flat Mine (Mine No. 308) of the Elk Lick Coal Company, was the first commercial mine in the county. This mine is in what appears to be the Beckley seam and was opened in 1906 or 1907. In 1910 the same company opened the Spruce Knob Mine (Mine No. 225) on North Fork of Cherry River in the Sewell seam, abandoning the Lost Flat Mine the same year. In 1916 J. W. Dwyer opened the Dwyer Mine (Mine No. 424, now Tuck Brothers) near the Fayette County line in the No. 6 Pocahontas seam. It was not until 1922 that Greenbrier County came to the front as one of the major coal-producing counties in the State. In this year several mines were opened in the Sewell seam along Meadow Creek.

At the present time about 95 per cent. of the coal production in Greenbrier County comes from the Sewell seam, but there is a large reserve of excellent coal in the lower seams. If prospecting with good results is any guide, there should be several mines opened in these lower seams in the near future.

The following tables, mainly assembled from statistics given in the Annual Reports of the West Virginia Department of Mines, supplemented by certain unpublished data from N. P. Rhinehart, present Chief, gives the coal production of the county since 1907, the relative rank in production as compared to other counties and the production of coal by mines:

Greenbrier County Coal Production.

(Production by fiscal years ending June 30 of each year up to June 30, 1924; production by calendar years starting January 1, 1925).

Year.	Long Tons (2240 lbs.)	=Short Tons. (2000 lbs.)	Order.
1907	31,978	35,815	28
1908	36,066	40,394	28
1909	32,296	36,171	29
1910	21,688	24.290	32
1911	48,819	54,677	30
1912	52,358	58,641	27
1913	42,853	47,995	32
1914	22,633	25,349	33
1915	24,128	27,023	32
1916	35,692	39,975	32
1917	45,207	50,632	32
1918	37,311	41,788	32
1919	33,695	37,738	32
1920	52,398	58,686	33
1921	52,153	58,411	33
1922	400,938	449,050	21
1923	431,643	483,440	24
1924	826,185	925,327	18
1924(a)	503,383	563,789	18
1925(b)	1,181,016	1,322,738	18
1926(b)	1,278,688	1,432,131	19
1927(b)	1,428,716	1,600,162	18
1928(b)	1,480,544	1,658,209	18
1929(b)	1,598,240	1,790,029	18
1930(b)	1,814,716	2,032,482	14
1931(b)	1,621,671	1,816,272	13
1932(b)	1,199,347	1,343,269	14
1933(b)	1,464,357	1,640,080	14
1934(b)	1,559,847	1,747,029	13
1935(b)	1,421,104	1,591,636	14
1936(b)	1,598,224	1,790,011	14
Totals	20,377,894	22,823,239	

(a) Last six months of 1924.
(b) Calendar Year.

Coal Tonnage Production in Greenbrier County by the Various Mines for the Year Ending June 30, 1907.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Lost Flat	31,978	373	....	31,605
For the Year Ending June 30, 1908.					
Elk Lick Coal Co.	Lost Flat	36,066	711	....	35,355
For the Year Ending June 30, 1909.					
Elk Lick Coal Co.	Lost Flat	32,296	774	....	31,522
For the Year Ending June 30, 1910.					
Elk Lick Coal Co.	Spruce Knob	13,372	134	93	13,145
Elk Lick Coal Co.	Lost Flat	8,316	480	112	7,724
Totals		21,688	614	205	20,869

For the Year Ending June 30, 1911.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	48,819	281	134	48,404
For the Year Ending June 30, 1912.					
Elk Lick Coal Co.	Spruce Knob	52,358	285	158	51,915
For the Year Ending June 30, 1913.					
Elk Lick Coal Co.	Spruce Knob	42,853	268	123	42,462
For the Year Ending June 30, 1914.					
Elk Lick Coal Co.	Spruce Knob	22,633	295	114	22,224
For the Year Ending June 30, 1915.					
Elk Lick Coal Co.	Spruce Knob	24,128	352	104	23,672

For the Year Ending June 30, 1916.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Dwyer, J. W.	Dwyer	10,058	....	....	10,058
Elk Lick Coal Co.	Spruce Knob	25,634	359	121	25,154
Totals		35,692	359	121	35,212

For the Year Ending June 30, 1917.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	27,038	468	88	26,482
Meadow River Smokeless Coal Co.	Dwyer	18,169	....	320	17,849
Totals		45,207	468	408	44,331

For the Year Ending June 30, 1918.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	19,401	611	71	18,719
Meadow River Smokeless Coal Co.	Dwyer	17,910	....	84	17,826
Totals		37,311	611	155	36,545

For the Year Ending June 30, 1919.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	22,629	560	103	21,966
Meadow River Smokeless Coal Co.	Dwyer	11,066	....	2,771	8,295
Totals		33,695	560	2,874	30,261

For the Year Ending June 30, 1920.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	29,207	776	169	28,262
Lincoln Smokeless Coal Co.	Lincoln No. 1	3,191	....	300	2,891
Meadow River Smokeless Coal Co.	Dwyer	20,000	....	240	19,760
Totals		52,398	776	709	50,913

For the Year Ending June 30, 1921.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	32,893	1,135	252	31,506
Lincoln Smokeless Coal Co.	Lincoln No. 1	10.710	....	....	10,710
Meadow River Smokeless Coal Co.	Dwyer	8,550	....	85	8,465
Totals		52,153	1,135	337	50,681

For the Year Ending June 30, 1922.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	32,018	1,304	247	30,467
Frances Coal Co.	Frances	7,680	....	....	7,680
Greenbrier Smokeless Coal Co.	Greenbrier	37,535	....	191	37,344
Imperial Smokeless Coal Co.	Quinwood	79,178	....	....	79,178
McRoss Smokeless Coal Co.	Lincoln No. 1	4,500	....	1,100	3,400
Margarette Coal Co.	Margarette Nos. 1 & 2	65,402	390	1,005	64,007
Meadow Creek Coal Co.	Crichton	52,411	....	400	52,011
Meadow River Smokeless Coal Co.	Dwyer	5,890	....	1,500	4,390
Nelson Fuel Co.	No. 1	44,817	....	400	44,417
Nelson Fuel Co.	No. 2	71,507	....	270	71,237
Totals		400,938	1,694	5,113	394,131

For the Year Ending June 30, 1923.

Name of Company	Name of Mine	Production of Coal. (Tons of 2240 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	37,896	1,526	248	36,122
Frances Coal Co.	Frances	29,680	....	240	29,440
Greenbrier Smokeless Coal Co.	Greenbrier	42,573	....	347	42,226
Imperial Smokeless Coal Co.	Quinwood	71,954	....	287	71,667
McRoss Smokeless Coal Co.	Lincoln No. 1	11,691	....	550	11,141
Margarette Coal Co.	Margarette No. 1	35,398	....	964	34,434
Margarette Coal Co.	Margarette No. 2	25,742	1,537	2,726	21,479
Meadow Creek Coal Co.	Crichton	59,809	....	384	59,425
Meadow River Smokeless Coal Co.	Dwyer	14,000	....	1,500	12,500
Nelson Fuel Co.	Nelson No. 1	70,113	....	1,101	69,012
Nelson Fuel Co.	Nelson No. 2	32,787	....	....	32,787
Totals		431,643	3,063	8,347	420,233

For the Year Ending June 30, 1924.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	60,360	2,022	305	58,033
Frances Coal Co.	Frances	65,607	....	300	65,307
Greenbrier Smokeless Coal Co.	Greenbrier	94,968	....	277	94,691
Imperial Smokeless Coal Co.	Quinwood	174,155	....	318	173,837
Margarette Coal Co.	Margarette No. 1	91,504	1,200	600	89,704
Margarette Coal Co.	Margarette No. 2	87,991	1,200	600	86,191
Meadow Creek Coal Co.	Crichton	87,940	....	520	87,420
Midland Smokeless Coal Co.	Midland No. 2	3,800	....	....	3,800
Nelson Fuel Co.	Nelson Nos. 1 & 2	259,002	....	813	258,189
Totals		925,327	4,422	3,733	917,172

Coal Tonnage from July 1, 1924, to December 31, 1925.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	64,448	2,782	459	61,207
Frances Coal Co.	Frances	74,297	....	403	73,894
Greenbrier Smokeless Coal Co.	Greenbrier	202,251	....	900	201,351
Imperial Smokeless Coal Co.	Quinwood	352,149	25	576	351,548
Margarette Coal Co.	Margarette	464,826	6,547	2,138	456,141
Meadow Creek Coal Co.	Crichton	214,376	....	708	213,668
Midland Smokeless Coal Co.	Midland	2,213	....	1,077	1,136
Nelson Fuel Co.	Nelson Nos. 1 & 2	511,967	....	2,088	509,879
Totals		1,886,527	9,354	8,349	1,868,824

For the Calendar Year 1926.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal.		
			Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	43,259	1,953	342	40,964
Frances Coal Co.	Frances	62,172	....	480	61,692
Greenbrier Smokeless Coal Co.	Greenbrier	202,480	....	725	201,755
Imperial Smokeless Coal Co.	Quinwood	287,328	....	530	286,798
Margarette Coal Co.	Margarette No. 2	290,044	7,373	1,845	280,826
Meadow Creek Coal Co.	Crichton	168,783	....	576	168,207
Meadow River Fuel Co.	Lincoln	1,645	....	300	1,345
Midland Smokeless Coal Co.	Midland	3,000	....	1,800	1,200
Nelson Fuel Co.	Nelson No. 1	362,741	....	2,230	360,511
Nelson Fuel Co.	Nelson No. 2	10,679	....	....	10,679
Totals		1,432,131	9,326	8,828	1,413,977

For the Calendar Year 1927.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob	29,421	1,807	291	27,323
Frances Coal Co.	Frances	77,456	....	893	76,563
Greenbrier Smokeless Coal Co.	Bellburn	249,798	....	4,200	245,598
Imperial Smokeless Coal Co.	Quinwood	358,933	....	672	358,261
Johnstown Coal & Coke Co.	Crichton	168,176	....	3,510	164,666
Margarette Coal Co.	Margarette No. 2	356,360	7,200	1,685	347,475
Meadow River Fuel Co.	Lincoln	1,064	....	830	234
Nelson Fuel Co.	Nelson No. 1	358,954	....	3,230	355,724
Totals		1,600,162	9,007	15,311	1,575,844

For the Calendar Year 1928.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants	Shipped from Mine.
Elk Lick Coal Co.	Spruce Knob and Turkey Run	16,657	874	193	15,590
Frances Coal Co.	Frances	58,144	....	465	57,679
Greenbrier Smokeless Coal Co.	Bellburn	263,629	....	396	263,233
Imperial Smokeless Coal Co.	Quinwood	374,452	....	724	373,728
Johnstown Coal & Coke Co.	Crichton	191,927	....	765	191,162
Leckie Smokeless Coal Co.	Leckie Nos. 1, 2, 3, 4, & 5	54,914	....	200	54,714
Margarette Coal Co.	Margarette	339,089	6,500	1,340	331,249
Meadow River Fuel Co.	Lincoln	2,000	....	2,000	....
Nelson Fuel Co.	Nelson No. 1	357,397	....	3,500	353,897
Totals		1,658,209	7,374	9,583	1,641,252

For the Calendar Year 1929.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Clear Creek Coal Co.	Clearco No. 1	907	....	175	750
Frances Coal Co.	Frances	72,547	....	....	72,547
Greenbrier Smokeless Coal Co.	Bellburn	269,822	....	230	269,592
Imperial Smokeless Coal Co.	Quinwood	382,785	....	1,322	381,463
Johnstown Coal & Coke Co.	Crichton No. 1	206,628	....	819	205,809
Leckie Smokeless Coal Co.	Leckie Nos. 1, 2, 3, 4, & 5	252,775	....	775	252,000
Margarette Coal Co.	Margarette No. 1	337,268	6,000	2,000	329,268
Meadow River Fuel Co.	Lincoln	4,430	....	3,546	884
New River & Poca. Cons. Coal Co.	Leslie	261,747	....	4,241	257,506
Tuck Brothers	Dwyer	1,120	....	....	1,120
Totals		1,790,029	6,000	13,090	1,770,939

For the Calendar Year 1930.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal.		
			Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Clear Creek Coal Co.	Clearco Nos. 1 & 2	45,034	....	194	44,840
Frances Coal Co.	Frances	97,675	....	....	96,675
Greenbrier Smokeless Coal Co.	Crichton No. 2	197,112	....	896	196,216
Imperial Smokeless Coal Co.	Quinwood	319,846	....	1,508	318,338
Johnstown Coal & Coke Co.	Crichton	208,274	....	550	207,724
Leckie Smokeless Coal Co.	Leckie	327,992	....	800	327,192
Margarette Coal Co.	Margarette	386,177	6,000	4,000	376,177
Meadow River Fuel Co.	Lincoln	9,353	....	3,726	5,627
New River & Poca. Cons. Coal Co.	Leslie	433,169	....	6,439	426,730
Tuck Brothers	Dwyer	7,850	....	100	7,750
Totals		2,032,482	6,000	18,213	2,008,269

For the Calendar Year 1931.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal.		
			Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Clear Creek Coal Co.	Brooke Nos. 1 & 2	112,211	125	224	111,862
Frances Coal Co.	Frances	58,219	500	500	57,219
Greenbrier Smokeless Coal Co.	Crichton No. 2	152,701	....	1,584	151,117
Imperial Smokeless Coal Co.	Quinwood	248,447	....	1,416	247,031
Johnstown Coal & Coke Co.	Crichton No. 1	174,280	....	1,021	173,259
Leckie Smokeless Coal Co.	Leckie	278,477	....	977	277,500
Margarette Coal Co.	Margarette	372,113	6,000	2,000	364,113
Meadow River Fuel Co.	Lincoln	1,102	....	1,102	....
Midland Smokeless Coal Co.	Midland No. 1	1,851	....	955	896
New River & Poca. Cons. Coal Co.	Leslie	374,100	....	5,650	368,450
Tuck Brothers	Dwyer	42,771	....	800	41,971
Totals		1,816,272	6,625	16,229	1,793,418

For the Calendar Year 1932.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Clear Creek Coal Co.	Brooke Nos. 1 & 2	68,051	156	155	67,740
Frances Coal Co.	Frances	58,865	....	1,200	57,665
Greenbrier Smokeless Coal Co.	Crichton No. 2	128,886	....	1,014	127,872
Imperial Smokeless Coal Co.	Quinwood	190,997	....	562	190,435
Johnstown Coal & Coke Co.	Crichton No. 1	123,248	....	769	122,479
Leckie Smokeless Coal Co.	Leckie	275,087	1,500	3,500	270,087
Margarette Coal Co.	Margarette	254,125	8,000	4,200	241,925
Meadow River Fuel Co.	Lincoln	2,528	....	2,076	452
Midland Smokeless Coal Co.	Midland	5,270	....	1,136	4,140
New River & Poca. Cons. Coal Co.	Leslie	236,212	....	2,537	233,675
Totals		1,343,269	9,656	17,143	1,316,470

For the Calendar Year 1933.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal.		
			Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Clear Creek Coal Co.	Brooke	126,278	159	212	125,907
Frances Coal Co.	Frances	64,857	....	795	64,062
Greenbrier Smokeless Coal Co.	Crichton No. 2	136,862	....	1,297	135,565
Imperial Smokeless Coal Co.	Quinwood	240,074	....	536	239,538
Johnstown Coal & Coke Co.	Crichton No. 1	152,092	....	626	151,466
Leckie Smokeless Coal Co.	Leckie	317,296	....	2,099	315,197
Margarette Coal Co.	Margarette	294,039	7,141	5,709	281,189
Meadow River Fuel Co.	Lincoln	848	....	698	150
Midland Smokeless Coal Co.	Midland	4,256	....	658	3,598
New River & Poca. Cons. Coal Co.	Leslie	275,359	130	4,801	270,428
Raine Lumber & Coal Co.	Duo	28,119	....	12	28,107
Totals		1,640,080	7,430	17,443	1,615,207

For the Calendar Year 1934.

Name of Company	Name of Mine	Production of Coal. (Tons of 2000 lbs.)	Distribution of Coal. Used in Operation of Mine.	Furnished local trade and tenants.	Shipped from Mine.
Burley Coal Co.	Burley	19,382	123	23	19,236
Clear Creek Coal Co.	Brooke	153,642	132	318	153,192
Frances Coal Co.	Frances	58,001	....	699	57,302
Greenbrier Smokeless Coal Co.	Crichton No. 2	120,629	....	1,319	119,310
Imperial Smokeless Coal Co.	Quinwood	243,728	....	564	243,164
Johnstown Coal & Coke Co.	Crichton No. 1	148,610	....	683	147,927
Leckie Smokeless Coal Co.	Leckie	368,419	2,450	1,464	364,505
Margarette Coal Co.	Margarette	279,814	12,000	4,000	263,814
Meadow River Fuel Co.	Lincoln	1,044	....	1,044	....
Midland Smokeless Coal Co.	Midland	3,735	....	810	2,925
New River & Poca. Cons. Coal Co.	Leslie	313,635	....	10,218	303,417
Raine Lumber & Coal Co.	Raine	36,390	....	282	36,108
Totals		1,747,029	14,705	21,424	1,710,900

For the Calendar Year 1935.

Name of Company.	Name of Mine.	Production of Coal. (Tons of 2,000 lbs.)	Distribution of Coal.	
			Used Locally and Stocked.	Railroad Shipments.
Burley Coal Co.	Burley	4,526	....	4,526
Clear Creek Coal Co.	Brooke	161,006	555	160,451
Frances Coal Co. (I. F. Vass and Bonner H. Hill, Trustees)	Frances	31,834	763	31,071
Greenbrier Smokeless Coal Co.	Crichton No. 2	124,080	1,514	122,566
Imperial Smokeless Coal Co.	Quinwood	202,252	1,114	201,138
Johnstown Coal & Coke Co.	Crichton No. 1	139,984	537	139,447
Leckie Smokeless Coal Co.	Leckie	321,964	....	321,964
Margarette Coal Co. (I. F. Vass and Bonner H. Hill, Trustees)	Margarette	227,430	12,552	214,878
Meadow River Fuel Co.	Lincoln	1,330	1,000	330
Midland Smokeless Coal Co.	Midland	17,439	385	17,054
New River & Poca. Cons. Coal Co.	Leslie	300,323	14,810	285,513
Raine Lumber & Coal Co.	Duo	55,868	257	56,391
Totals		1,588,036	33,487	1,555,329
Truck Mines		3,600	3,600	....
Totals		1,591,636	37,087	1,555,329

For the Calendar Year 1936.

Company.	Mine.	Production of Coal (Tons of 2,000 lbs.
Clear Creek Coal Co	Brooke Nos. 1 and 2	161,366
a—Frances Coal Co	Frances	15,160
*A—Gauley Coal Land Co	....	....
Greenbrier Smokeless Coal Co.	Crichton No. 2	167,780
C—Greenbrier Firecreek Coal Co	Midland	10,979
Imperial Smokeless Coal Co	Quinwood	240,737
Johnstown Coal & Coke Co	Crichton No. 1	183,716
Leckie Smokeless Coal Co	Leckie Nos. 1 and 2	327,207
b—Margarette Coal Co	Margarette	....
B—Margarette Coal Corp	Margarette	234,737
*—Meadow River Fuel Co	Lincoln	225
c—Midland Smokeless Coal Co	Midland	10,791
New River & Poca. Cons. C. Co	Leslie	360,594
Raine Lumber & Coal Co	Duo	76,719
Total		1,790,011

*Ceased (Mine or Company Ceased Operation).

a—Predecessor.

A—Successor.

b—Predecessor.

B—Successor.

c—Predecessor.

C—Successor.

RECORDS OF COAL TEST BORINGS.

SUMMARIZED RECORDS.

Within Greenbrier County 31 holes have been drilled for testing coal, 27 of which are located in Meadow Bluff District, one in Williamsburg District, and the remaining three in Irish Corner District. In the near-by parts of Nicholas, Fayette, and Monroe Counties there have been 78 cores drilled, most of which have bearing on the coal resources of Greenbrier County. Since the records of most of these holes were not available at the time of publication of the previous reports, it is deemed advisable to include them in this volume. The records of these holes have been correlated and will be found on succeeding pages.

It will be noted that the numbers given to the holes in adjoining counties are not always in sequence; this was done to avoid, so far as possible, the renumbering of cores listed in previous publications of the Survey.

The following table, while lacking some of the details it should contain, gives the surface elevation, ownership, and, when available, the key number on Map II, by which the locations of the borings may be found. In the elevation column the letter "L" signifies a spirit-level determination, the sign "±" means that the elevation was taken from the topographic map, and the letter "B" indicates that an aneroid barometer was used, checked on the nearest Government elevation. A question mark beside the depth to the various coals indicates uncertainty of the correlation. The following abbreviations of company names have been used:

W. E. Deegans C. C.............W. E. Deegans Coal Corporation.

Margarette Coal, et al.........Margarette Coal Company and W. E. Deegans.

W. Va. Coal & Coke..............West Virginia Coal & Coke Company.

Brackens Cr..........................Brackens Creek Coal & Land Company.

Babcock C. & C......................Babcock Coal & Coke Company.

N. R. & P. C. C......................New River & Pocahontas Consolidated Coal Company.

Summarized Record of Coal Test Borings

No. on Map II.	Name of Property	Magisterial District.	Company.	Surface Elevation.
1	Mrs. E. T. Martin No. 1	Meadow Bluff	Nutter Hrs.	1930'B
2	Meadow River Coal & Land Co.	Meadow Bluff	W. E. Deegans C. C.?	....
3	Meadow River Coal & Land Co.	Meadow Bluff	W. E. Deegans C. C.?	....
4	Meadow River Coal & Land Co.	Meadow Bluff	W. E. Deegans C. C.?	3125'B
5	Gauley Coal Land Co.	Meadow Bluff	Margarette Coal, et al.	....
5A	Leckie Smokeless Coal Co. No. 4	Meadow Bluff	Leckie Smokeless Coal..	3357'L
5B	Leckie Smokeless Coal Co. No. 2	Meadow Bluff	Leckie Smokeless Coal..	3304'L
5C	Leckie Smokeless Coal Co. No. 1	Meadow Bluff	Leckie Smokeless Coal..	3447'L
5D	Leckie Smokeless Coal Co. No. [illegible]	Meadow Bluff	Leckie Smokeless Coal..	3368'L
5E	Gauley Coal Land Co. No. 30	Meadow Bluff	Gauley Coal Land	3832'
5F	Leckie Smokeless Coal Co. No. 6	Meadow Bluff	Leckie Smokeless Coal..	3296'L
5G	Leckie Smokeless Coal Co. No. 7	Meadow Bluff	Leckie Smokeless Coal..	3297'L
5H	Leckie Smokeless Coal Co. No. 5	Meadow Bluff	Leckie Smokeless Coal..	3385'L
5I	Leckie Smokeless Coal Co. No 3	Meadow Bluff	Leckie Smokeless Coal..	3437'L
5J	Gauley Coal Land Co. No. 10A	Meadow Bluff	Leckie Smokeless Coal..	3637'L
5K	Gauley Coal Land Co. No. 10	Meadow Bluff	Leckie Smokeless Coal..	[illegible]
5L	Gauley Coal Land Co. No. 11	Meadow Bluff	Leckie Smokeless Coal..	3695'L
5M	Gauley Coal Land Co. No. 12	Meadow Bluff	Leckie Smokeless Coal..	[illegible]
6	Raine Lumber & Coal Co. No. [illegible]	Meadow Bluff	Raine Lumber & Coal..	[illegible]
7	Raine Lumber & Coal Co. No. 4	Meadow Bluff	Raine Lumber & Coal..	4015'L
8	Raine Lumber & Coal Co. No. [illegible]	Meadow Bluff	Raine Lumber & Coal..	[illegible]
9	Raine Lumber & Coal Co. No. 3	Meadow Bluff	Raine Lumber & Coal..	3990'L
10	Raine Lumber & Coal Co. No. 7	Meadow Bluff	Raine Lumber & Coal..	4240'L
11	Raine Lumber & Coal Co. No. 2	Meadow Bluff	Raine Lumber & Coal..	4010'L
12	Gauley Coal Land Co. No. 3	Meadow Bluff	Gauley Coal Land	3951'L
13	Gauley Coal Land Co. No. 1	Meadow Bluff	Gauley Coal Land	3808'L
14	Gauley Coal Land Co. No. 2	Meadow Bluff	Gauley Coal Land	[illegible]
15	Raine Lumber & Coal Co. No. [illegible]	Williamsburg	Raine Lumber & Coal..	4125'B
16	Hunter Moore No. 1	Irish Corner	Homer Hoke, et al.	[illegible]
17	Mary E. Morris Hrs. No. [illegible]	Irish Corner	Homer Hoke, et al.	1895'B
18	A. W. Smith No. 3	Irish Corner	Homer Hoke, et al.	1705'B
19	Harry Ellis No. [illegible]	(Monroe Co.)	Homer Hoke, et al.	1855'B
25	Gauley Coal Land Co. No. 28	(Nicholas)	W. Va. Coal & Coke.	[illegible]
26	Gauley Coal Land Co. No. [illegible]	(Nicholas)	W. Va. Coal & Coke..	[illegible]
27	Gauley Coal Land Co. No. 24	(Nicholas)	W. Va. Coal & Coke.	[illegible]
[illegible]A	Gauley Coal Land Co. No. 21	(Nicholas)	W. Va. Coal & Coke..	2190'±
29	Gauley Coal Land Co. No. 23	(Nicholas)	W. Va. Coal & Coke	2590'B
30	Gauley Coal Land Co. No. 23A.	(Nicholas)	W. Va. Coal & Coke	2580'B
31	Gauley Coal Land Co. No. 11	(Nicholas)	W. Va. Coal & Coke	[illegible]
32	Gauley Coal Land Co. No. [illegible]	(Nicholas)	Gauley Coal Land	2325'B
33	Gauley Coal Land Co. No. [illegible]	(Nicholas)	W. Va. Coal & Coke	2045'B
37	Gauley Coal Land Co. No. 4	(Nicholas)	Gauley Coal Land	1660'B
38	Gauley Coal Land Co. No. 1	(Nicholas)	[illegible]	[illegible]
39	Gauley Coal Land Co. No. 13	(Nicholas)	W. Va. Coal & Coke	2162'L
40	Gauley Coal Land Co. No. [illegible]	(Nicholas)	W. Va. Coal & Coke	2715'B
41	Gauley Coal Land Co. No. [illegible]	(Nicholas)	W. Va. Coal & Coke	2210'B
[illegible]	Gauley Coal Land Co. No.	(Nicholas)	Gauley Coal Land	2055'B
[illegible]	Gauley Coal Land Co. No. 27	(Nicholas)	W. Va. Coal & Coke	2225'B
45	Gauley Coal Land Co. No. [illegible]	(Nicholas)	W. Va. Coal & Coke	2400'B
46	Gauley Coal Land Co. No. 14	(Nicholas)	Gauley Coal Land	2300'±
46A	Gauley Coal Land Co. No. [illegible]	(Nicholas)	Gauley Coal Land	[illegible]'±
46B	Gauley Coal Land Co. No. [illegible]	(Nicholas)	Gauley Coal Land	2375'±
46C	Gauley Coal Land Co. No. 22A.	(Nicholas)	Gauley Coal Land	2480'±
47	Gauley Coal Land Co. No. 29	(Nicholas)	W. Va. Coal & Coke..	2740'B
48	Gauley Coal Land Co. No. 17	(Nicholas)	W. Va. Coal & Coke..	2420'B
49	Gauley Coal Land Co. No. [illegible]	(Nicholas)	W. Va. Coal & Coke..	2510'B
[illegible]	Gauley Coal Land Co. No. [illegible]	(Nicholas)	Gauley Coal Land	2375'B

for Greenbrier County and Adjoining Area.

Sewell Coal.			Little Raleigh Coal.		Beckley Coal.		Fire Creek Coal.		No. 6 Pocahontas Coal.		No. 3 Pocahontas Coal.			
Depth Base.	Thickness Inches.	Elevation Base.	Depth Base.	Thickness Inches.	Depth Base.	Thickness Inches.	Depth Base.	Thickness Inches.	Depth Base.	Thickness Inches.	Depth Base.	Thickness Inches.	Total Depth Feet.	No. on Map II.
....	....	....	....	....	....	....	....	....	364.1	29	....	....	368.0	1
....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
....	....	....	....	....	....	....	....	....	....	....	....	....	....	3
....	....	....	....	....	....	....	....	....	....	....	....	....	....	4
....	....	....	41.9	28	169.5	18	216.5	29	....	....	....	....	302.0	5
....	....	....	141.7	....	271.7	....	359?	....	....	....	....	....	555.0	5A
....	....	....	....	....	105.5	....	191?	....	....	....	....	....	325.0	5B
....	....	....	156.5	....	255.2	....	322?	....	498.5	....	584.3	....	587.0	5C
....	....	....	....	....	116.1	....	168.3	....	....	....	....	....	175.0	5D
381.9	41	3450′	....	....	....	....	....	....	....	....	....	....	387.0	5E
....	....	....	....	....	71.1	....	123.7	....	....	....	....	....	158.0	5F
....	....	....	....	....	84.0	....	....	....	....	....	....	....	198.0	5G
....	....	....	73.5	....	201.1	....	285?	....	....	....	....	....	290.0	5H
....	....	....	43.7	....	....	....	250.5	....	....	....	....	....	330.0	5I
77.4	....	3560′L	....	....	....	....	....	....	....	....	....	....	80.0	5J
30.5	....	3567′L	190.4	....	310.5	....	....	....	....	....	....	....	324.5	5K
212.0	....	3483′L	....	....	....	....	....	....	....	....	....	....	215.0	5L
130.7	....	3367′L	322?	....	322?	....	....	....	....	....	....	....	470.0	5M
79.2	51	3551′L	235.3	49	332.0	12	....	....	603.3	28	....	....	607.0	6
483.0	41	3532′L	....	....	....	....	....	....	....	....	....	....	489.0	7
425.0	47	3660′L	....	....	....	....	....	....	....	....	....	....	432.0	8
294.4	33	3696′L	....	....	....	....	....	....	....	....	....	....	450.0	9
452.5	30	3788′L	....	....	....	....	....	....	....	....	....	....	460.0	10
53.3	38	3957′L	195.0	2	338.0	9	447?	6	642.9	10	758.5	....	839.0	11
....	....	....	....	....	133.3	28	230.5	....	438?	1	....	....	465.5	12
....	....	....	....	....	....	....	56?	2	263.9	42	384.9	1	541.0	13
....	....	....	....	....	58.1	38	122.5	26	361.9	12	490?	3	577.0	14
....	....	....	....	....	....	....	....	....	55.5	41	158?	28	271.0	15
....	....	....	....	....	....	....	....	....	....	....	....	....	329.0	16
....	....	....	....	....	....	....	....	....	....	....	....	....	223.0	17
....	....	....	....	....	....	....	....	....	....	....	....	....	216.0	18
....	....	....	....	....	....	....	....	....	....	....	....	....	156.0	19
261.2	15	2269′B	....	....	467.9	16	....	....	....	....	....	....	550.0	25
197.1	60	1928′B	....	....	....	....	....	....	....	....	....	....	200.0	26
307?	1	2293′B	....	....	....	....	....	....	....	....	....	....	476.0	27
133.0	41	2057′±	....	....	....	....	....	....	....	....	....	....	137.0	27A
....	....	....	....	....	....	....	....	....	....	....	....	....	....	29
173.1	22	2407′B	....	....	....	....	....	....	....	....	....	....	177.0	30
134.3	43	2181′B	....	....	....	....	....	....	....	....	....	....	138.0	31
131.5	44	2194′B	....	....	....	....	....	....	....	....	....	....	285.0	32
146.7	40	1898′B	....	....	....	....	....	....	....	....	....	....	150.0	33
161?	....	1499′B	....	....	....	....	....	....	....	....	....	....	236.0	37
111.4	54	1689′L	....	....	....	....	....	....	....	....	....	....	640.0	38
158.8	25	2003′L	243?	....	332?	6	....	....	....	....	....	....	400.0	39
611.5	93	2103′B	....	....	....	....	....	....	....	....	....	....	615.5	40
....	....	....	....	....	....	....	....	....	....	....	....	....	311.0	41
442.0	26	1613′B	....	....	....	....	....	....	....	....	....	....	445.5	43
....	....	....	....	....	....	....	....	....	....	....	....	....	450.0	44
384.1	34	2016′B	....	....	....	....	....	....	....	....	....	....	392.0	45
99.1	36	2201′±	....	....	....	....	....	....	....	....	....	....	196.0	46
416.8	26	2183′±	....	....	....	....	....	....	....	....	....	....	419.0	46A
82.3	52	2293′±	198?	3	312?	6	362?	7	520?	5	....	....	665.0	46B
185.0	43	2295′±	....	....	....	....	....	....	....	....	....	....	289.0	46C
221.8	38	2518′B	....	....	....	....	....	....	....	....	....	....	227.0	47
137.4	38	2283′B	....	....	....	....	....	....	....	....	....	....	141.5	48
148.2	48	2362′B	....	....	....	....	....	....	....	....	....	....	151.0	49
....	....	....	118.9	8	....	....	268?	23	....	....	....	....	384.0	50

Summarized Record of Coal Test Borings for

No. on Map II.	Name of Property.	Magisterial District.	Company.	Surface Elevation.
51	Gauley Coal Land Co. No. 7	(Nicholas)	Gauley Coal Land	2435'B
52	Gauley Coal Land Co. No. 5	(Nicholas)	Gauley Coal Land	2090'B
93	Brackens Cr. C. & L. Co. No. 2	(Fayette)	Nuttall Hrs.	2357'L
93B	Brackens Cr. C. & L. Co. No. 4	(Fayette)	Brackens Cr.	2124'L
93C	Brackens Cr. C. & L. Co. No. 3	(Fayette)	Brackens Cr.	2345'L
93D	Brackens Cr. C. & L. Co. No. 1	(Fayette)	Brackens Cr.	2431'L
94	Charles White	(Fayette)	Nuttall Hrs.	2460'B
95	Nuttall Hrs.	(Fayette)	Nuttall Hrs.	2655'B
96	Nuttall Hrs.	(Fayette)	Nuttall Hrs.	2545'B
97	Jno. Jordan-Amick	(Fayette)	[illegible] C. & C.	2430'B
111	Henry No. 3	(Fayette)	N. R. & P. C. C.	2545'L
112	N. R. & Poca. C. C. Co. No. 19	(Fayette)	N. R. & P. C. C.	2641'L
113	N. R. & Poca. C. C. Co. No. 20	(Fayette)	N. R. & P. C. C.	2595'L
114	N. R. & Poca. C. C. Co. No. 8NS.	(Fayette)	N. R. & P. C. C.	2976'L
115	N. R. & Poca. C. C. Co. No. 22	(Fayette)	N. R. & P. C. C.	2801'L
116	N. R. & Poca. C. C. Co. No. 18	(Fayette)	N. R. & P. C. C.	2571'L
117	N. R. & Poca. C. C. Co. No. 2	(Fayette)	N. R. & P. C. C.	2863'L
118	N. R. & Poca. C. C. Co. No. 1	(Fayette)	N. R. & P. C. C.	2621'L
119	N. R. & Poca. C. C. Co. No. 5	(Fayette)	N. R. & P. C. C.	2554'L
120	N. R. & Poca. C. C. Co. No. 21	(Fayette)	N. R. & P. C. C.	2560'L
121	N. R. & Poca. C. C. Co. No. 17	(Fayette)	N. R. & P. C. C.	2739'L
122	N. R. & Poca. C. C. Co. No. 15	(Fayette)	N. R. & P. C. C.	2781'L
123	N. R. & Poca. C. C. Co. No. 14	(Fayette)	N. R. & P. C. C.	2584'L
124	N. R. & Poca. C. C. Co. No. 10	(Fayette)	N. R. & P. C. C.	2564'L
124A	N. R. & Poca. C. C. Co. No. 11	(Fayette)	N. R. & P. C. C.	2722'L
125	N. R. & Poca. C. C. Co. No. 4	(Fayette)	N. R. & P. C. C.	2865'L
126	N. R. & Poca. C. C. Co. No. 3	(Fayette)	N. R. & P. C. C.	2904'L
127	N. R. & Poca. C. C. Co. No. 23	(Fayette)	N. R. & P. C. C.	2978'L
128	N. R. & Poca. C. C. Co. No. 7NS.	(Fayette)	N. R. & P. C. C.	3215'L
129	N. R. & Poca. C. C. Co. No. 12	(Fayette)	N. R. & P. C. C.	2872'L
130	N. R. & Poca. C. C. Co. No. 6NS	(Fayette)	N. R. & P. C. C.	3120'L
131	N. R. & Poca. C. C. Co. No. 5NS	(Fayette)	N. R. & P. C. C.	2804'?
132	N. R. & Poca. C. C. Co. No. 8	(Fayette)	N. R. & P. C. C.	2741'L
133	N. R. & Poca. C. C. Co. No. 9	(Fayette)	N. R. & P. C. C.	[illegible]19'L
134	N. R. & Poca. C. C. Co. No. 13	(Fayette)	N. R. & P. C. C.	2844'L
135	N. R. & Poca. C. C. Co. No. 7	(Fayette)	N. R. & P. C. C.	2774'L
136	N. R. & Poca. C. C. Co. No. 16	(Fayette)	N. R. & P. C. C.	2845'L
137	N. R. & Poca. C. C. Co. No. 4NS.	(Fayette)	N. R. & P. C. C.	2914'L
138	N. R. & Poca. C. C. Co. No. 6	(Fayette)	N. R. & P. C. C.	2741'L
139	N. R. & Poca. C. C. Co. No. 3NS	(Fayette)	N. R. & P. C. C.	2895'L
140	N. R. & Poca. C. C. Co. No. 24	(Fayette)	N. R. & P. C. C.	2746'L
141	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	....
142	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	[illegible]
143	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	[illegible]
144	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	[illegible]
145	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	3105'L
146	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	3155'L
147	Bellwood Coal Co. No. 10	(Fayette)	Bellwood Coal	[illegible]
148	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	[illegible]
149	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	3153'L
150	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	[illegible]
151	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	3144'L
152	Bellwood Coal Co. No. [illegible]	(Fayette)	Bellwood Coal	3196'L

Greenbrier County and Adjoining Area—(Continued).

Sewell Coal.			Little Raleigh Coal.		Beckley Coal.		Fire Creek Coal.		No. 6 Pocahontas Coal.		No. 3 Pocahontas Coal.			
Depth Base.	Thickness Inches.	Elevation Base.	Depth Base.	Thickness Inches.	Depth Base.	Thickness Inches.	Depth Base.	Thickness Inches.	Depth Base.	Thickness Inches.	Depth Base.	Thickness Inches.	Total Depth Feet.	No. on Map II.
....	....	....	....	....	....	....	201?	5	....	....	....	....	385.3	51
....	....	....	....	....	....	....	56?	9	....	....	....	....	175.0	52
159.4	18	2198'L	310.8	7	....	....	....	....	....	....	....	....	365.0	93
144.0	29	1980'L	....	....	....	....	....	....	....	....	....	....	247.5	93B
227.5	42	2117'L	....	....	....	....	....	....	....	....	....	....	229.0	93C
182.7	13	2248'L	....	....	....	....	....	....	....	....	....	....	300.0	93D
241.6	46	2218'B	....	....	....	....	....	....	....	....	....	....	....	94
....	....	....	....	....	....	....	....	....	....	....	....	....	....	95
....	....	....	....	....	....	....	....	....	....	....	....	....	(600?)	96
....	....	....	....	....	....	....	225.2	38	....	....	....	....	....	97
....	....	....	....	....	111.3	5	....	....	....	....	....	....	300.0	111
....	....	....	....	....	....	....	128.9	18	279.8	43	....	....	282.0	112
....	....	....	....	....	....	....	141.3	12	305?	14	410.8	17	495.0	113
....	....	....	....	....	....	....	348?	4	435.5	18	....	....	....	114
....	....	....	....	....	27.4	12	123.5	3	273?	11	....	....	277.4	115
....	....	....	....	....	45?	3	176.9	50	327.7	34	....	....	336.2	116
....	....	....	109.0	4	184?	....	....	....	....	....	....	....	419.7	117
....	....	....	....	....	154.5	6	221.5	5	402.9	22	....	....	513.1	118
....	....	....	....	....	149.9	13	223.4	....	....	....	....	....	292.1	119
....	....	....	....	....	54.4	7	....	....	....	....	....	....	215.0	120
....	....	....	108.0	6	....	....	315.9	16	....	....	....	....	386.0	121
....	....	....	78?	13	....	....	....	....	....	....	....	....	343.3	122
....	....	....	....	....	....	....	24?	4	159.2	8	....	....	219.0	123
....	....	....	....	....	....	....	....	....	146.9	26	....	....	150.0	124
....	....	....	....	....	....	....	186?	8	298?	19	....	....	328.0	124A
....	....	....	....	....	....	....	....	....	436.9	19	....	....	459.3	125
....	....	....	38.4	4	....	....	291?	4	425.3	21	521.3	13	532.9	126
....	....	....	....	....	....	....	219?	7	383?	8	473?	6	511.0	127
....	....	....	....	....	....	....	412?	20	498?	6	....	....	....	128
....	....	....	....	....	130?	1	....	....	398?	69	....	....	439.0	129
....	....	....	106?	12	....	....	....	....	....	....	532?	2	....	130
....	....	....	....	....	....	....	....	....	....	....	....	....	....	131
....	....	....	....	....	....	....	45?	2	215.7	57	....	....	232.8	132
....	....	....	....	....	....	....	56?	8	201.2	16	305.3	2	335.0	133
....	....	....	....	....	....	....	....	....	313.9	9	410.4	4	421.2	134
....	....	....	....	....	....	....	....		....	....	....	....	432.5	135
....	....	....	....	....	....	....	....	....	136.9	56	....	....	141.6	136
....	....	....	....	....	....	....	....	....	184?	2	....	....	....	137
....	....	....	....	....	....	....	....	....	119.2	14	227.9	34	232.0	138
....	....	....	....	....	....	....	128?	1	209.2	50	....	....	....	139
....	....	....	....	....	....	....	....	....	111.9	20	202.5	17	205.0	140
....	....	....	....	....	....	....	....	....	....	....	....	....	....	141
56.6	....	3228'L	....	....	327?	6	394?	....	564.7	47	....	....	583.6	142
....	....	....	....	....	....	....	....	....	46?	48	148.3	18	200.0	143
....	....	....	....	....	....	....	....	....	180.1	38	282.7	25	442.8	144
....	....	....	....	....	....	....	....	....	142.3	98	....	....	143.0	145
....	....	....	....	....	....	....	....	....	177.1	128	....	....	180.0	146
....	....	....	....	....	....	....	....	....	208.0	117	....	....	208.5	147
....	....	....	....	....	....	....	....	....	192.9	118	....	....	194.6	148
....	....	....	....	....	....	....	....	....	202.0	88	....	....	206.8	149
....	....	....	....	....	....	....	....	....	196.8	124	....	....	201.1	150
....	....	....	....	....	....	....	....	....	139.3	57	....	....	145.5	151
....	....	....	....	....	....	....	17.1	13	176.7	107	....	....	183.7	152

DETAILED COAL TEST RECORDS.
MEADOW BLUFF DISTRICT.

Of the 27 coal test borings that have been drilled in Meadow Bluff District, the complete records of 12 have been secured for publication. The records of 12 borings, drilled for the Leckie Smokeless Coal Company were available to the Survey and permission was granted for publication of the records exclusive of the coal sections. The remaining three holes were drilled on Little Sewell Mountain but their records could not be found.

Borings **Nos. 1, 5E, 6, 7, 11,** and **13** were included in Chapter V because of their stratigraphic importance.

The following record is of a hole drilled by the Margarette Coal Company and W. E. Deegans. No elevation for the hole is available, but what are believed to be the correct correlations for the various beds are indicated in the record:

Gauley Coal Land Company Coal Test Boring No. 1—No. 5 on Map II.

Meadow Bluff District; on south side of Meadow Creek, 0.4 mile northeast of Marfrance; or 0.2 mile northwest of location shown on map; started, Dec. 6, 1929; completed, Jan. 7, 1930.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (302′+)				
Surface	3	0	3	0
Sandstone	0	6	3	6
Shale, sandy	5	6	9	0
Shale, gray	17	0	26	0
Shale, dark, sandy	13	6	39	6
Coal, bony, Little Raleigh?	2	4	41	10
Fire clay, sandy	5	2	47	0
Shale, dark	6	0	53	0
Sandstone 9′ 0″; Sandstone, hard 33 0; Sandstone, mixed with coal streaks, hard 4 0; Sandstone, hard 1 0 — Lower Raleigh?	47	0	100	0
Shale, light, sandy	4	6	104	6
Sandstone, hard	13	0	117	6
Shale, dark, sandy	50	6	168	0
Coal, Beckley?	1	6	169	6
Fire clay	3	6	173	0
Slate, blue	5	6	178	6
Sandstone	7	4	185	10
Slate, blue	6	2	192	0
Sandstone, hard	7	8	199	8

	Thickness. Ft.	In.	Total. Ft.	In.
Fire clay, sandy	1	10	201	6
Sandstone, hard	0	6	202	0
Continued with record of **W. E. Deegans No. 1** (Above boring deepened, beginning at 202′; started, Jan. 13, 1930; completed, Jan. 15, 1930).				
Sandstone, hard	3	2	205	2
Shale, dark	8	11	214	1
Coal, Fire Creek?	2	5	216	6
Fire clay	3	4	219	10
Slate, black	3	2	223	0
Shale, dark, sandy	10	0	233	0
Shale, light, sandy	50	6	283	6
Sandstone	13	6	297	0
Sandstone, hard, with hard slate streaks	5	0	302	0

The following 12 records are of borings drilled northwest of Anjean for the Leckie Smokeless Coal Company, partly on their own property and partly on land leased from the Gauley Coal Land Company. As prospecting is still in progress, permission to publish the actual coal sections was withheld. The beds immediately above the coal seams are included in the measurement indicated by coal bed correlations:

Leckie Smokeless Coal Company Coal Test Boring No. 4—No. 5A on Map II.

Meadow Bluff District; on west side of Brown Creek 1.2 miles northwest of mouth, 2.1 miles west of Anjean; started, April 20, 1931; completed, May 29, 1931; elevation, 3357′ L.

				Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (555′+)							
Surface				18	6	18	6
Shale, dark, sandy				16	6	35	0
Sandstone, broken, hard	30′	0″	**Upper Raleigh Sandstone**	72	0	107	0
Sandstone and shale	2	0					
Sandstone, broken, hard	14	0					
Shale, dark	2	0					
Sandstone, broken, hard	17	0					
Shale, dark	1	0					
Sandstone, broken, hard	6	0					
Shale, dark, sandy				20	0	127	0
Shale, dark, and **coal, Little Raleigh**				14	8	141	8
Fire clay, shaly				7	4	149	0
Shale, blue, sandy				16	0	165	0
Sandstone, broken, hard	20′	0″	**Lower Raleigh Sandstone**	50	0	215	0
Sandstone, shale streaks	5	0					
Sandstone, broken, hard	25	0					
Shale, blue, sandy				20	0	235	0
Shale, dark-blue, sandy				20	0	255	0
Shale, dark, and **coal, Beckley** (3085′)				16	8	271	8

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, dark	0	3	271	11
Fire clay	2	0	273	11
Fire clay, sandy	2	1	276	0
Shale, gray, sandy	4	0	280	0
Sandstone, hard ... 11′ 0″ Shale, blue ... 2 0 Sandstone, hard ... 14 0 Shale, dark ... 1 0 Sandstone, hard ... 29 0 Quinnimont Sandstone	57	0	337	0
Shale, gray, sandy, shale, dark, and coal, (Little Fire Creek?) Fire Creek? (2998′)	22	0	359	0
Shale, soft	5	0	364	0
Shale, sandy, blue	11	0	375	0
Sandstone, hard, Pineville	32	0	407	0
Shale, blue, sandy	7	0	414	0
Shale, dark, and coal, No. 8 Pocahontas	8	6	422	6
Fire clay, soft	1	6	424	0
Shale, dark, sandy	20	0	444	0
Fire clay, splint	3	0	447	0
Shale, dark, sandy	12	0	459	0
Sandstone, soft, and coal, No. 7 Pocahontas	21	10	480	10
Shale, blue, sandy	5	0	485	10
Shale, dark	10	0	495	10
Shale, blue, sandy	24	0	519	10
Shale, soft, blue	15	2	535	0
Shale, blue, sandy	4	0	539	0
Sandstone, hard, Eckman	16	0	555	0

Leckie Smokeless Coal Company Coal Test Boring No. 2—No. 5B on Map II.

Meadow Bluff District; on the southwest side of Pollock Knob, 1.6 miles northwest of Anjean; started, Aug. 29, 1930; completed, Sept. 16, 1930; elevation, 3303.9′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (325+)				
Surface	4	8	4	8
Shale, gray, sandy	6	4	11	0
Sandstone, reddish	18	0	29	0
Shale, light, sandy	60	0	89	0
Shale, dark, sandy, and slate, black, and coal, Beckley (3198′)	16	6	105	6
Fire clay	1	6	107	0
Shale, gray, sandy	2	0	109	0
Sandstone, hard, Quinnimont	51	6	160	6
Shale, dark, sandy	3	6	164	0
Sandstone	3	4	167	4
Sandstone, with shale streaks, shale, sandy, and coal, (Little Fire Creek?) Fire Creek? (3113′)	23	4	190	8
Slate, black	2	0	192	8
Fire clay, sandy	2	4	195	0
Sandstone, Pineville	31	6	226	6
Shale, sandy	2	0	228	6
Sandstone	6	0	234	6

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, sandy, and coal, No. 9 Pocahontas	33	9	268	3
Shale, dark, sandy	4	6	272	9
Shale, gray, sandy, and coal, No. 8 Pocahontas	10	8	283	5
Sandstone and shale streaks, Flattop	15	0	298	5
Shale, dark	1	3	299	8
Sandstone	3	0	302	8
Shale, dark, sandy	2	0	304	8
Shale, gray, sandy	3	4	308	0
Sandstone, with shale streaks, shale, dark, and coal, No. 7 Pocahontas (2983′)	13	0	321	0
Shale, light, sandy	4	0	325	0

Leckie Smokeless Coal Company Coal Test Boring No. 1—No. 5C on Map II.

Meadow Bluff District; on southeast side of Pollock Knob, 1½ miles north-northwest of Anjean; started, June 17, 1930; completed, July 17, 1930; elevation, 3446.7′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (587′+)				
Surface	3	6	3	6
Sandstone	23	0	26	6
Shale, dark	1	4	27	10
Sandstone	7	2	35	0
Shale, dark	14	6	49	6
Sandstone	2	6	52	0
Shale, dark, sandstone streaks, and coal, Little Raleigh "A"	67	5	119	5
Fire clay, sandy	2	7	122	0
Shale, sandy, light	17	0	139	0
Sandstone	6	0	145	0
Shale, sandy, light, black slate, and coal, Little Raleigh	11	7	156	7
Shale, sandy, light	5	5	162	0
Sandstone	10	0	172	0
Sandstone, with shale streaks	14	0	186	0
Shale, sandy, blue, shale, sandy, dark, and coal, Beckley "Rider"	21	8	207	8
Slate	0	2	207	10
Shale, sandy, dark	8	2	216	0
Shale, sandy, light, black slate, and coal, Beckley (3191′)	39	3	255	3
Fire clay, sandy	1	9	257	0
Shale, gray, sandy, and bony coal	25	4	282	4
Fire clay, sandy	3	8	286	0
Shale, dark, sandy, and slate, dark, Fire Creek Coal horizon (3125′)	36	0	322	0
Fire clay, sandy	3	0	325	0
Shale, sandy	10	0	335	0
Sandstone	25	0	360	0
Shale, sandy, dark	27	0	387	0
Shale and sandstone streaks	13	0	400	0
Sandstone, shale, dark, sandy, and coal, No. 9 Pocahontas	6	3	406	3
Fire clay, sandy	2	0	408	3

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, gray, sandy and coal, No. 8 Pocahontas	9	5	417	8
Shale, gray, sandy	8	0	425	8
Sandstone	3	4	429	0
Shale, dark, sandy	4	0	433	0
Fire clay, shaly	4	0	437	0
Shale, light, sandy, and coal, No. 7 Pocahontas	21	8	458	8
Fire clay, sandy	0	2	458	10
Shale, dark, sandy	1	10	460	8
Slate, soft	0	2	460	10
Shale, dark	1	0	461	10
Shale, sandy, light, and slate, black, No. 6 Pocahontas Coal horizon (2948′)	36	8	498	6
Shale, light, sandy	6	0	504	6
Shale, dark, sandy	13	6	518	0
Sandstone, hard	30	0	548	0
Sandstone, hard, with coal streaks	5	6	553	6
Sandstone, hard	12	0	565	6
Shale, dark, sandy	4	0	569	6
Sandstone	1	6	571	0
Slate, dark	1	2	572	2
Sandstone, conglomerate, and coal streak, No. 3 Pocahontas Coal horizon (2862′)	12	2	584	4
Sandstone, conglomerate	2	8	587	0

Leckie Smokeless Coal Company Coal Test Boring No. 8—No. 5D on Map II.

Meadow Bluff District; on Pollock Mountain 2.75 miles north of Anjean and 1.25 miles northwest of Sam Creek; started, April 8, 1936; completed, April 24, 1936; elevation, 3367.6′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (175′+)				
Sand, boulders, and clay	38	0	38	0
Shale, sandy	15	0	53	0
Shale, blue, hard, and coal, Beckley "Rider"	16	9	69	9
Shale, sandy	3	3	73	0
Sandstone	3	0	76	0
Shale, sandy	1	0	77	0
Sandstone	3	6	80	6
Shale, sandy	5	6	86	0
Sandstone	1	0	87	0
Shale, dark, and coal, Beckley (3251′)	29	2	116	2
Fire clay, sandy	3	1	119	3
Shale, sandy	3	9	123	0
Sandstone	2	0	125	0
Rock, hard, blue	7	6	132	6
Sandstone, white, crystallized, Quinnimont	30	11	163	5
Shale, sandy, sandstone, and coal, Fire Creek (3199′)	4	11	168	4
Slate and bone	0	1	168	5
Shale, sandy	0	10	169	3
Fire clay	1	8	170	11
Shale, sandy	4	1	175	0

The record of coal test boring **No. 5E** will be found in Chapter V.

Leckie Smokeless Coal Company Coal Test Boring No. 6—No. 5F on Map II.

Meadow Bluff District; on south end of Pollock Mountain, 0.55 mile northwest of Anjean; started, Nov. 11, 1935; completed, Nov. 21, 1935; elevation, 3295.8′ L.

	Thickness.		Total.	
Pottsville Series (158′+)	Ft.	In.	Ft.	In.
Clay, boulders, and sand	16	0	16	0
Sand and boulders	17	0	33	0
Shale, blue	27	6	60	6
Shale, gray, slate, black, and **coal, Beckley** (3225′)	10	8	71	2
Shale, gray	0	10	72	0
Shale, sandy	6	0	78	0
Sandstone	2	0	80	0
Shale, dark-blue	2	6	82	6
Sandstone, hard, white, **Quinnimont**	23	6	106	0
Shale, sandy, blue, and **coal, Fire Creek** (3172′)	17	8	123	8
Fire clay	3	6	127	2
Slate, gray	8	0	135	2
Shale, sandy	2	0	137	2
Slate, black	0	10	138	0
Slate, gray	5	6	143	6
Slate, black	1	10	145	4
Fire clay	1	4	146	8
Slate, gray	1	8	148	4
Shale, sandy, yellow, and blue	9	8	158	0

Leckie Smokeless Coal Company Coal Test Boring No. 7—No. 5G on Map II.

Meadow Bluff District; on east side of Pollock Mountain, 1.2 miles north of Anjean; started, Dec. 16, 1935; completed, Mar. 31, 1936; elevation, 3296.8′ L.

				Thickness.		Total.	
Pottsville Series (198′+)				Ft.	In.	Ft.	In.
Clay, sand, and boulders				25	0	25	0
Shale, blue				46	6	71	6
Slate, black, and **coal, Beckley** (3213′)				12	5	83	11
Shale, light				4	1	88	0
Sandstone, hard, white	18′	0″					
Shale, blue	4	0	**Quinnimont**				
Shale, sandy	10	0	**Sandstone**	43	0	131	0
Sandstone, hard, white	11	0					
Shale, sandy				24	0	155	0
Sandstone, hard, white, **Pineville**				43	0	198	0

Leckie Smokeless Coal Company Coal Test Boring No. 5—No. 5H on Map II.

Meadow Bluff District; on east side of Brown Creek, 1.85 miles north of mouth, 1.75 miles northwest of Anjean; started, Sept. 25, 1935; completed, Nov. 1, 1935; elevation, 3385.3′ L.

	Thickness.		Total.	
Pottsville Series (290′+)	Ft.	In.	Ft.	In.
Clay, yellow, and boulders	11	0	11	0
Clay layers and sandstone	4	0	15	0
Sandstone, **Upper Raleigh**	20	0	35	0
Shale, sandy	16	0	51	0
Shale, blue, and **coal, Little Raleigh**	22	7	73	7
Fire clay	4	5	78	0
Shale, gray	2	0	80	0
Shale, gray, sandy	15	7	95	7
Shale and hard blue rock	4	5	100	0
Shale, gray	10	0	110	0
Sandstone, hard, white, **Lower Raleigh**	33	0	143	0
Slate and coal, **Beckley "Rider"**	9	4	152	4
Shale, sandy, shale, blue, and **coal, Beckley** (3184′)	48	10	201	2
Fire clay	0	10	202	0
Sandstone, white, fine, **Quinnimont**	63	0	265	0
Shale, blue	1	10	266	10
Shale, sandy, slate, dark, slate, black, and **coal, (Little Fire Creek?) Fire Creek?** (3100′)	18	7½	285	5½
Slate, black	1	5	286	10½
Shade, sandy	3	1½	290	0

Leckie Smokeless Coal Company Coal Test Boring No. 3—No. 5I on Map II.

Meadow Bluff District; on east side of Brown Creek, 2.75 miles north of mouth and 2.55 miles north of Anjean; started, Aug. 26, 1930; completed, Sept. 4, 1930; elevation, 3436.7′ L.

	Thickness.		Total.	
Pottsville Series (330′+)	Ft.	In.	Ft.	In.
Surface	4	0	4	0
Sandstone	1	0	5	0
Shale, gray, sandy	15	0	20	0
Sandstone, hard	6	0	26	0
Shale, dark, sandy	11	0	37	0
Sandstone and **coal, Little Raleigh**	6	8	43	8
Shale and sandstone streaks	53	4	97	0
Shale, dark, sandy, and **coal, Beckley "Rider"** (3311′)	29	8	126	8
Shale, dark	2	4	129	0
Fire clay, sandy	2	0	131	0
Shale, light, sandy	12	0	143	0
Shale, dark, sandy	40	0	183	0
Sandstone, **Quinnimont**	31	0	214	0
Shale, light, sandy	21	0	235	0
Shale, dark, sandy, slate, broken up, and **coal, Fire Creek** (3186′)	15	6	250	6

	Thickness. Ft.	In.	Total. Ft.	In.
Sandstone, hard	18	6	269	0
Shale, light, sandy, and **coal, Little Fire Creek** (3161′)	6	6	275	6
Fire clay	1	6	277	0
Shale, gray, sandy	2	0	279	0
Slate, black	3	6	282	6
Fire clay	1	6	284	0
Shale, light, sandy	32	6	316	6
Shale, dark	1	6	318	0
Shale, gray, sandy, and **coal, No. 9 Pocahontas**	8	0	326	0
Shale, dark, sandy	0	7	326	7
Shale, light, sandy	3	5	330	0

Leckie Smokeless Coal Company Coal Test Boring No. 10A—No. 5J on Map II.

Meadow Bluff District; on west side of Pollock Mountain, 3.6 miles north of Anjean and 2 miles west of Duo; started, May 23, 1936; completed, June 2, 1936; elevation, 3637.4′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (80′+)				
Clay, yellow	8	0	8	0
Shale, yellow	4	0	12	0
Clay, yellow, and sand	3	0	15	0
Shale, yellow	2	6	17	6
Shale, blue, and **coal, Sewell "A"**	27	4	44	10
Fire clay	2	2	47	0
Shale, blue	3	0	50	0
Shale, sandy, and **coal, Sewell** (3560′ L.)	27	5	77	5
Fire clay	0	4	77	9
Shale, sandy	2	3	80	0

Leckie Smokeless Coal Company Coal Test Boring No. 10—No. 5K on Map II.

Meadow Bluff District; on west side of Pollock Mountain, 3.6 miles north of Anjean and 2.05 miles west of Duo; started, May 5, 1936; completed, May 25, 1936; elevation, 3597.4′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (324′+)				
Sand and clay; sandstone and shale, broken; shale and **coal, Sewell** (3567′)	30	6	30	6
Fire clay	3	4	33	10
Sandstone	8	2	42	0
Shale, blue	17	0	59	0
Slate, black	3	0	62	0
Shale, blue	5	0	67	0
Sandstone, crystallized	17	0	84	0
Slate, black, and **coal, Welch**	12	0	96	0
Fire clay	2	6	98	6
Shale, dark	7	6	106	0
Slate, black	3	0	109	0
Shale, gray	7	0	116	0
Shale, sandy	59	0	175	0

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, dark-blue, slate, black, and **coal, Little Raleigh**	15	5	190	5
Fire clay	0	7	191	0
Shale, hard, blue	18	0	209	0
Shale, sandy	28	0	237	0
Sandstone, hard, **Lower Raleigh**	30	0	267	0
Slate, black	36	0	303	0
Slate, blue, and **coal, Beckley** (3287′)	7	7	310	7
Fire clay, sandy	4	5	315	0
Shale, sandy	7	0	322	0
Sandstone, hard, **Quinnimont**	2	6	324	6

Leckie Smokeless Coal Company Coal Test Boring No. 11—No. 5L on Map II.

Meadow Bluff District; on east side of Huggins Ridge, 3.8 miles north of Anjean and 2.3 miles west of Duo; started, June 8, 1936; completed, June 19, 1936; elevation, 3695.3′ L.

				Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (215′+)							
Clay and boulders				8	0	8	0
Sandstone, brown	20′	0″	**Harvey**	34	0	42	0
Sandstone, gray	14	0					
Shale, sandy and **coal, Castle** (3587′)				65	11	107	11
Fire clay				0	1	108	0
Shale, sandy				4	0	112	0
Sandstone and shale streaks	28′	0″	**Guyandot**	54	0	166	0
Sandstone	5	6					
Shale, blue	5	6					
Sandstone	15	0					
Shale, sandy, slate, blue, and **coal, Sewell "A"**				15	2	181	2
Shale, sandy				6	2	187	4
Sandstone and shale streaks	1′	3″	**Lower Guyandot**	20	2	207	6
Sandstone	1	4					
Sandstone and shale streaks	1	1					
Sandstone	4	0					
Shale, sandy	1	10					
Sandstone	10	8					
Shale, sandy, slate, dark, and **coal, Sewell** (3483′)				4	6	212	0
Fire clay				1	7	213	7
Shale, sandy				1	5	215	0

Leckie Smokeless Coal Company Coal Test Boring No. 12—No. 5M on Map II.

Meadow Bluff District; at head of Brown Creek, 4.7 miles north of Anjean and 2.5 miles northwest of Duo; started, June 27, 1936; completed, July 10, 1936; elevation, 3497.6′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (470′+)				
Clay and silt	4	0	4	0

				Thickness. Ft.	In.	Total. Ft.	In.
Shale, sandy, and **coal, Castle**				26	8	30	8
Slate, black				0	4	31	0
Sandstone and shale streaks	10′	0″	Guyandot	44	0	75	0
Sandstone	11	0					
Sandstone and shale streaks	23	0					
Slate, dark-blue				8	4	83	4
Shale, sandy				1	8	85	0
Sandstone				7	6	92	6
Shale, sandy, shale, hard, blue, slate, black, and **coal, Sewell "A"**				14	9	107	3
Slate, black				0	5	107	8
Shale, sandy, slate, black, and **coal, Sewell** (3367′)				23	0	130	8
Fire clay				3	6	134	2
Sandstone	24′	4″	Welch?	31	10	166	0
Sandstone, with shale streaks	7	6					
Slate, dark				5	4	171	4
Sandstone				13	8	185	0
Shale, sandy				6	0	191	0
Slate, blue				7	6	198	6
Shale, sandy				1	8	200	2
Slate, black, and **coal, Welch?**				7	2	207	4
Slate, black				0	8	208	0
Shale, sandy				6	0	214	0
Sandstone and shale streaks	6′	6″	Upper Raleigh?	66	0	280	0
Sandstone, hard	8	6					
Shale, blue, and sandstone	51	0					
Slate, black				3	6	283	6
Sandstone, hard, and shale				9	6	293	0
Slate, black				6	0	299	0
Shale, dark-blue, slate, black, and **coal, Little Raleigh? (Beckley?)**				23	3	322	3
Fire clay				2	3	324	6
Shale, gray				19	0	343	6
Sandstone, hard	13′	0″	Lower Raleigh?	66	6	410	0
Shale, gray, sandy	13	6					
Sandstone, hard	18	0					
Shale, gray	1	5					
Sandstone, hard, white	17	7					
Sandstone and shale streaks	3	0					
Slate, black				1	8	411	8
Shale, sandy				25	2	436	10
Slate, dark-blue				33	2	470	0

The records of coal test borings **Nos. 6 and 7** will be found in Chapter V.

The following three records were furnished the Survey by Mr. J. W. Raine, of Duo:

Raine Lumber and Coal Company Coal Test Boring No. 6—No. 8 on Map II.

Meadow Bluff District; near the northern end of Smokehouse Ridge, two miles east of Duo; elevation, 4085′ L.

				Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Pottsville Series—New River Group (432′ +)							
Surface				3	0	3	0
Sandstone, hard	39′	6″	Lower				
Shale, dark, with sand streaks	53	6	Nuttall	93	0	96	0
Clay, with **coal streaks, Iaeger "A"**				0	3	96	3
Fire clay				4	11	101	2
Shale, dark, sandy	9′	6″					
Shale, dark	6	0	Upper				
Sandstone	0	6	Iaeger	44	10	146	0
Shale, dark, with sand streaks	5	6					
Shale, dark	23	4					
Coal, Hughes Ferry (3938′)				1	6	147	6
Fire clay, dark				2	4	149	10
Sandstone and shale				3	7	153	5
Shale, dark, with sandy streaks				18	8	172	1
Shale, dark, with lime (?) streaks				24	5	196	6
Coal	1′	1″	Lower				
Fire clay	2	4					
Coal	0	5	Iaeger	3	10	200	4
Clay, sandy				11	0	211	4
Sandstone				4	5	215	9
Shale, sandy				0	7	216	4
Sandstone				1	8	218	0
Shale, sandy				0	8	218	8
Sandstone				2	9	221	5
Shale, sandy				2	8	224	1
Sandstone				0	10	224	11
Shale, sandy				2	6	227	5
Sandstone	16′	2″					
Shale, dark	2	9					
Sandstone	5	9	Harvey				
Shale, dark, sandy	1	5	Conglomerate	30	11	258	4
Sandstone	4	6					
Coal	0	1					
Sandstone	0	3					
Shale, dark, sandy, **Sandy Huff**				21	8	280	0
Coal, Castle (3804′)				1	4	281	4
Fire clay				4	0	285	4
Clay, sandy				2	9	288	1
Shale, dark, sandy				2	5	290	6
Sandstone	9′	2″					
Sandstone, with shale streaks	17	8					
Shale, dark	4	7					
Shale, light	2	0	Guyandot				
Sandstone	17	6	Sandstone	82	9	373	3
Shale, dark, sandy	2	8					
Sandstone	14	0					
Limestone (?)	1	2					
Sandstone	14	0					

	Thickness. Ft.	In.	Total. Ft.	In.
Slate, black	5	9	379	0
Coal, cannel 0′ 6″; Coal 0 10 } Sewell "A"	1	4	380	4
Fire clay	1	10	382	2
Shale, dark, sandy	6	0	388	2
Sandstone, Lower Guyandot	7	4	395	6
Shale, dark	14	10	410	4
Slate, black 3′ 9″; Shale, dark 6 11 } Hartridge Black Shale	10	8	421	0
Coal, cannel 0′ 3″; Coal 3 8 } Sewell (3660′)	3	11	424	11
Fire clay, dark	7	1	432	0

Raine Lumber and Coal Company Coal Test Boring No. 3—No. 9 on Map II.

Meadow Bluff District; 2.5 miles east of Duo; elevation, 3990′ L.

Pottsville Series—New River Group (450′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	9	6	9	6
Shale, gray, sandy, Lower Iaeger	20	0	29	6
Sandstone, Harvey Conglomerate	87	6	117	0
Shale, dark, and sandstone streaks, Sandy Huff	8	6	125	6
Slate	0	6	126	0
Coal, Castle (3863′)	1	1	127	1
Fire clay	2	9	129	10
Shale, gray, sandy 14′ 2″; Sandstone, with shale streaks 12 0; Shale, dark, with sandstone streaks 8 6 } Guyandot Sandstone	34	8	164	6
Shale, dark	11	0	175	6
Shale, dark, sandy	10	6	186	0
Sandstone	12	0	198	0
Shale, dark	8	0	206	0
Slate, black	4	2	210	2
Coal, Sewell "A"	0	7	210	9
Fire clay, sandy	2	3	213	0
Shale, dark, sandy	15	6	228	6
Shale, dark	40	6	269	0
Slate, black, Hartridge Black Shale	13	10	282	10
Coal, cannel 0′ 3″; Slate, black 1 4; Coal, dirty 1 6; Slate 6 3; Coal 1 3; Fire clay, dark, with coal spars 1 0 } Sewell (3696′)	11	7	294	5
Fire clay, sandy	0	5	294	10
Shale, gray, sandy	1	6	296	4
Sandstone, hard, Welch	34	0	330	4
Shale, dark	1	8	332	0
Coal, Welch	0	2	332	2

	Thickness. Ft.	In.	Total. Ft.	In.
Sandstone, hard, **Upper Raleigh**	25	6	357	8
Shale, dark, sandy	2	0	359	8
Fire clay, dark	3	5	363	1
Fire clay, shaly	5	6	368	7
Sandstone and coal spars	20	5	389	0
Shale, dark, and sandstone, mixed	4	0	393	0
Shale, dark, sandy	8	6	401	6
Coal, dirty, Little Raleigh "A"	0	11	402	5
Fire clay	1	7	404	0
Shale, dark, sandy	18	6	422	6
Shale, gray, sandy	19	6	442	0
Sandstone	8	0	450	0

Raine Lumber and Coal Company Coal Test Boring No. 7—No. 10 on Map II.

Meadow Bluff District; near Job Knob, 3 miles east of Duo; elevation, 1240' L.

Pottsville Series—New River Group (460'+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	3	0	3	0
Sandstone, brown.... 38' 6"; Shale, dark .... 1 6; Sandstone, with shale streaks .... 50 9 } **Lower Nuttall**	90	9	93	9
Coal, bony, Iaeger "A"	0	4	94	1
Fire clay, sandy	3	8	97	9
Sandstone, hard	8	3	106	0
Shale, dark, with sandstone streaks 30' 0"; Shale, dark .... 6 2 } **Upper Iaeger**	36	2	142	2
Slate, black	2	10	145	0
Coal, Hughes Ferry (4094')	1	1	146	1
Sandstone, **Middle Iaeger**	10	6	156	7
Shale, dark, sandy	16	4	172	11
Shale, dark, **Lower Iaeger?**	19	9	192	8
Sandstone, **Harvey Conglomerate?**	55	4	248	0
Shale, dark	43	0	291	0
Shale, dark, sandy, **Sandy Huff**	10	0	301	0
Shale, dark	0	6	301	6
Coal, Castle	0	10	302	4
Sandy clay	6	8	309	0
Sandstone, **Guyandot**	10	0	319	0
Shale, dark, sandy	30	0	349	0
Shale, dark	35	6	384	6
Coal, Sewell "A"	0	6	385	0
Sandy clay	2	0	387	0
Sandstone	2	0	389	0
Shale, dark, sandy	51	0	440	0
Slate, black, **Hartridge Black Shale**	10	0	450	0
Coal, cannel 0 2"; **Coal** 2 4 } **Sewell** (3788')	2	6	452	6
Fire clay, light	1	6	454	0
Fire clay, dark	6	0	460	0

Attention is called to the fact that in borings Nos. 11 to 15 inclusive the measurements were not always made at right angles to the bedding-plane of the formations penetrated. Only parts of the cores of Nos. 11, 14, and 15 were found but they showed a variation of 3° to 20° off vertical. The harder sandstone beds caused the greater migration.

The record of boring **No. 11** will be found on pages 172-4, Chapter V.

Gauley Coal Land Company Coal Test Boring No. 3—No. 12 on Map II.

Meadow Bluff District; on Rockcamp Ridge, 6.7 miles northeast of Anjean and 4.1 miles east of Duo; elevation, 3951′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series—New River Group (350′ 6″+)				
Surface	4	0	4	0
Sandstone, hard ...... 21′ 0″; Sandstone, hard, **coal** spars ...... 16 6 — **Lower Raleigh**	37	6	41	6
Shale, dark, soft	3	0	44	6
Sandstone, hard, dark, shale mixed	10	0	54	6
Shale, dark, sandy	30	0	84	6
Shale, dark	46	6	131	0
Coal ...... 1′ 6″; Bone **coal** ...... 0 10 — **Beckley** (3718′)	2	4	133	4
Slate, black	0	4	133	8
Shale, gray	2	6	136	2
Sandstone	0	8	136	10
Shale, gray	7	2	144	0
Shale, gray, sandy	11	3	155	3
Sandstone, hard, **coal** spars ...... 10′ 0″; **Coal** ...... 0 5; Fire clay ...... 0 4; Sandstone, hard, white 11 0 — **Quinnimont**	21	9	177	0
Shale, dark, sandy 17′ 0″; Shale, gray, sandy 25 0 — **Quinnimont Shale**	42	0	219	0
Fire clay, hard	3	0	222	0
Shale, gray, sandy	7	0	229	0
Slate, black, **Fire Creek Coal** horizon	1	6	230	6
Shale, gray	21	0	251	6
Slate, black, **Little Fire Creek Coal** horizon	4	0	255	6
Shale, gray, sandy	26	6	282	0
Coal and slate	0	2	282	2
Shale, dark, sandy	11	6	293	8
Bone **coal**	0	2	293	10
Fire clay	0	6	294	4
Shale, gray	3	6	297	10
Sandstone	4	10	302	8
Shale, dark, sandy	6	0	308	8
Slate	1	6	310	2

	Thickness. Ft.	In.	Total. Ft.	In.
Slate, black, and fire clay mixed	1	4	311	6
Fire clay, soft	1	0	312	6
Shale, gray	17	6	330	0
Shale, gray, sandy	20	6	350	6
Pottsville Series—Pocahontas Group (115'+)				
Sandstone, hard, **Flattop**	40	0	390	6
Slate, black	1	4	391	10
Fire clay, dark	1	2	393	0
Shale, gray	5	0	398	0
Shale, gray, sandy	8	6	406	6
Sandstone, **Pierpont**	31	2	437	8
Coal, No. 6 Pocahontas?	0	1	437	9
Fire clay, soft	0	4	438	1
Fire clay, sandy	1	0	439	1
Shale, gray, sandy	11	11	451	0
Sandstone	14	6	465	6

The record of boring **No. 13** will be found on pages 174-6 in Chapter V.

Gauley Coal Land Company Coal Test Boring No. 2—No. 14 on Map II.

Meadow Bluff-Williamsburg District line; seven miles N. 80° E. of Anjean on Little Clear Creek Mountain; elevation, 4168' L.

Pottsville Series—New River Group (280' 4"+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	3	6	3	6
Shale, brown, broken	5	0	8	6
Shale, brown, sandy	36	6	45	0
Shale, dark	9	8	54	8
Slate, black	0	3	54	11
Coal, Beckley (4110')	3	2	58	1
Fire clay, light	3	7	61	8
Shale, gray, sandy	3	4	65	0
Sandstone, hard ...... 43' 0"; Sandstone, hard, with coal spars 12' 7" } **Quinnimont**	55	7	120	7
Slate, black, soft	0	9	121	4
Coal, Fire Creek	1	2	122	6
Clay shale, soft, dark	5	0	127	6
Shale, dark	8	2	135	8
Shale, dark, sandy	26	4	162	0
Sandstone, hard, broken 57' 0"; Sandstone, fine-grained 12' 0" } **Pineville**	69	0	231	0
Shale, dark, sandy	2	3	233	3
Slate, black	0	10	234	1
Bone coal, No. 9 Pocahontas?	0	7	234	8
Shale, gray, sandy	7	4	242	0
Sandstone	4	0	246	0
Shale, dark, sandy	12	0	258	0
Shale, dark	14	8	272	8

			Thickness. Ft.	In.	Total. Ft.	In.
Bone coal .... 0′ 2″						
Slate 0 11						
Bone coal 0 1	No. 8 Pocahontas?..		3	8	270	4
Clay shale, dark 2 3						
Bone coal 0 3						
Shale, gray			4	0	280	4
Pottsville Series—Pocahontas Group (286′ 8″+)						
Sandstone, Flattop			25	0	305	4
Coal, No. 7 Pocahontas			0	4	305	8
Fire clay			1	8	307	4
Shale, dark			17	2	324	6
Shale, dark, sandy			21	0	345	6
Sandstone, hard .... 5′ 0″						
Shale, hard, gray, sandy 4 0	Pierpont Sandstone		15	4	360	10
Sandstone, hard 6 4						
Coal, No. 6 Pocahontas........			1	0	361	10
Clay shale, gray, sandy			1	2	363	0
Sandstone			2	7	365	7
Shale, gray			1	2	366	9
Fire clay			4	6	371	3
Clay shale			10	9	382	0
Slate, gray			4	0	386	0
Slate, coal, and sulphur........			0	3	386	3
Fire clay			0	11	387	2
Slate and coal spars			0	3	387	5
Shale, dark			5	5	392	10
Slate, soft, broken			0	10	393	8
Coal			0	10	394	6
Fire clay			3	6	398	0
Shale, gray			6	0	404	0
Slate, black			1	0	405	0
Fire clay			2	0	407	0
Shale, gray			14	6	421	6
Sandstone, Upper Pocahontas			34	0	455	6
Slate, gray			0	2	455	8
Coal, No. 3 Pocahontas?			0	1	455	9
Fire clay			0	3	456	0
Shale, gray, sandy			5	0	461	0
Shale, gray			4	6	465	6
Fire clay			1	0	466	6
Shale, gray			3	6	470	0
Clay shale, gray			3	6	473	6
Shale, gray			16	0	489	6
Slate and coal, No. 3 Pocahontas Coal?			0	3	489	9
Fire clay			3	3	493	0
Shale, gray			8	6	501	6
Sandstone, Lower Pocahontas?			28	0	529	6
Coal, No. 2 "A" Pocahontas?			0	4	529	10
Sandstone			4	8	534	6
Sandstone, with shale streaks........			6	0	540	6
Shale, dark, sandy			15	8	556	2
Slate, black .... 3′ 0″	No. 2 Pocahontas		3	10	560	0
Slate, black, soft 0 10	Coal horizon?					
Fire clay, sandy			2	0	562	0
Shale, gray, sandy			6	0	568	0
Shale, gray			7	0	575	0

	Thickness. Ft.	In.	Total. Ft.	In
Black slate, coal spars, No. 1 Pocahontas	0	3	575	3
Fire clay	1	9	577	0

DETAILED COAL TEST RECORDS, WILLIAMSBURG DISTRICT.

In Williamsburg District one test hole was drilled for coal. The record of this hole (No. 15) is supporting evidence of the comparative rapid dip of the rocks in the region of Grassy Knob. The top of the red shale that was found at an elevation of 3182′ in boring No. 11, (1.8 miles northwest) was found at an elevation of 3868′ in boring No. 15.

As stated on a foregoing page the measurements given in the following record are probably not true vertical measurements:

Raine Lumber and Coal Company Coal Test Boring No. 1—No. 15 on Map II.

Williamsburg District; 0.3 mile N. 70° E. from the Grassy Knob triangulation point; elevation, 4125′ B.

Pottsville Series—Pocahontas Group (256′+)				Thickness. Ft.	In.	Total. Ft.	In.
Surface				6	0	6	0
Sandstone, Pierpont				33	0	39	0
Shale, dark				13	0	52	0
Coal	1′	1″	No. 6 Pocahontas (4070′)				
Fire clay, with coal spars	1	3		3	5½	55	5½
Coal	1	1½					
Fire clay, soft				0	1½	55	7
Fire clay, hard				1	5	57	0
Shale, gray, sandy				27	0	84	0
Slate, black				1	0	85	0
Fire clay, soft				11	6	96	6
Sandstone				6	4	102	10
Shale, gray, sandy				28	2	131	0
Sandstone				11	6	142	6
Shale, gray, sandy				3	4	145	10
Shale, dark clay				9	6	155	4
Coal and clay mixed	1′	1″	No. 3 Pocahontas?				
Slate	0	7		2	4	157	8
Coal, dirty	0	8					
Shale, gray				2	4	160	0
Shale, gray, sandy				11	0	171	0
Shale, gray clay				2	0	173	0
Fire clay, with coal streaks	0′	8″	No. 3 Pocahontas? (3949′)				
Fire clay, dark	1	5		2	10	175	10
Black slate, coal spar	0	9					

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, dark	6	2	182	0
Fire clay	4	4	186	4
Shale, gray, sandy, hard	15	2	201	6
Sandrock, hard	31	6	233	0
Shale, dark, sandy	11	6	244	6
Slate, black	4	2	248	8
Fire clay, soft	7	4	256	0
Mauch Chunk Series (15'+)				
Shale and fire clay, hard	9	0	265	0
Shale, red	6	0	271	0

DETAILED COAL TEST RECORDS, IRISH CORNER DISTRICT.

In Irish Corner District three test holes have been drilled for coal. Another was drilled just across the county line in Monroe County. These holes all start in the Pocono Series of lower Mississippian age. As previously stated in Chapter VII, there appears to be little chance of finding coal of commercial thickness and purity in this series in Greenbrier County.

The following record with comments by Reger is reprinted from the Mercer, Monroe, and Summers Report, pages 671-672:

". . . . The Merrimac Coal horizon appears to belong about the level of the shale at 118-121 feet, the elevation of which is 1659' B., as compared to 1650' B., at Coal Prospect No. 797 on Map IV (**No. 503 on Map II** of present report), located slightly to the northwest. The black shale at 170-171 feet is plainly too low for the Merrimac Coal since the dip is northwestward, and it evidently belongs at or near the Langhorne horizon:"

Hunter Moore Coal Test Boring No. 1—No. 16 on Map II.

Irish Corner District; along road east of Second Creek and 0.5 mile north of Hokes Mill; authority, Homer Hoke et al.; elevation, 1780' B.

			Thickness. Feet.	Total. Feet.
Pocono Series (329'+)				
Sand and clay			8	8
Sandstone, **Squaw**			107	115
Shale			2	117
Sandstone			1	118
Shale, **Merrimac Coal** horizon?			3	121
Sandstone and shale, laminated			13	134
Sandstone	10'	**Lindside Sandstone**	36	170
Shale	15			
Sandstone, light-gray	4			
Sandstone	7			
Shale, black, "nearly **coal**," **Langhorne Coal?**			1	171

		Thickness. Feet.	Total. Feet.
Sandstone, gray, fine-grained ... 7'	Broad Ford		
Sandstone, with layers of shale ... 24			
Sandstone and shale ... 86			
Sandstone, dark, close-grained ... 7	Broad Ford ...	158	329
Sandstone, with quartz partings ... 21			
Sandstone, badly broken, to bottom ... 13			

The following record with comments by Reger is reprinted from the Mercer, Monroe, and Summers Report, page 671:

". . . . the coal partings found at 160-161 feet and having an elevation of 1734' B., apparently belong about the proper level for the Merrimac Coal and indicate its unreliable nature in this vicinity . . ."

Mary E. Morris Heirs Coal Test Boring No. 2—No. 17 on Map II.

Irish Corner District; near road fork east of Second Creek and 0.3 mile northeast of Hokes Mill; authority Homer Hoke et al.; elevation, 1895' B.

		Thickness. Feet.	Total. Feet.
Pocono Series (223'+)			
Sandstone and clay ...		19	19
Sandstone (water at 60')..126'			
Sandstone shale, "conglomerated" ... 2	Squaw Sand ...	141	160
Sandstone ... 13			
Coal partings, Merrimac? ...		1	161
Sandstone ...		16	177
Sandstone and shale ...		18	195
Shale ...		5	200
Shale and sandstone, to bottom ...		23	223

The following record with comments by Reger is reprinted from the Mercer, Monroe, and Summers Report, pages 670-671:

"On the evidence of surface outcrops the following hole starts below the level of the Merrimac Coal which should have an elevation of 1750 feet or more at this point, and it probably starts nearly 200 feet below the top of the Pocono Series . . . ."

A. W. Smith Coal Test Boring No. 3—No. 18 on Map II.

Irish Corner District; on east side of Second Creek just south of Hokes Mill; authority, Homer Hoke et al.; completed, May 11, 1922; elevation, 1705' B.

Pocono Series (216'+)		Thickness. Feet.	Total. Feet.
Clay and boulders		6	6
Sandstone, **Broad Ford**		45	51
Shale, black, **Sunbury**		49	100
Shale		35	135
Sandstone 52'	Berea		
Sandstone and shale 16	Berea	81	216
Sandstone, to bottom 13	Berea		

The following record is of a boring drilled in Monroe County 0.55 mile south of coal test boring No. 18. The record with comments by Reger is reprinted from the Mercer, Monroe, and Summers Report, page 670:

". . . . the Merrimac Coal horizon appears to have been penetrated at 63-64 feet, its elevation being 1791' B. . . . ."

Harry Ellis Coal Test Boring No. 4—No. 19 on Map II.

Monroe County, Second Creek District; on short branch of Second Creek 0.7 mile south of Hokes Mill; authority, Homer Hoke et al.; completed, May 25, 1922; elevation, 1855' B.

Pocono Series (156'+)	Thickness. Feet.	Total. Feet.
Shale, blue	16	16
Shale, dark and bluish-gray	34	50
Shale, carbonaceous	13	63
Shale, black, with **coal** seams, **Merrimac Coal?**	1	64
Shale, black	1	65
Shale and sandstone	26	91
Sandstone	14	105
Sandstone and shale, to bottom	51	156

DETAILED COAL TEST RECORDS, NICHOLAS COUNTY.

The records of the following borings in Nicholas County are published with the permission of Mr. J. S. McWhorter, Resident Attorney, Gauley Coal Land Company, Rupert, W. Va. The location and barometric surface elevation of most of these borings were given by Reger in the Nicholas County Report published in 1921. With three exceptions, however, the records of these borings were not available to Mr. Reger. For these exceptions see the comments immediately preceding the records of Nos. 25, 38, and 46B.

No elevations for these borings were found in the Gauley Coal Land Company's files, and it has been necessary to use the elevation shown on the topographic map for those bore

holes not found by Mr. Reger. In such cases the elevations are marked plus or minus (±).

The correlations shown in the records are the responsibility of the junior author and the slight discrepancy between the elevation of the Sewell Coal as shown in the cores and the structure contours on Map II of the Nicholas County Report may be accounted for in one or more of the following ways: (1) the elevations given for the top of the holes are necessarily inexact; (2) the location of some of the borings may be wrong; (3) intervals between beds, which must be used in drawing a structural map, are always variable.

The thickness of the Sewell Coal shown in the following record was given by Reger in the Nicholas County Report, page 431:

Gauley Coal Land Co. Coal Test Boring No. 28—No. 25 on Map II.

Nicholas County, Kentucky District; 1.7 miles west-northwest of Fenwick; elevation, 2530′ B.

				Thickness.		Total.	
Pottsville Series—New River Group (550′+)				Ft.	In.	Ft.	In.
Surface				18	0	18	0
Sandstone				4	0	22	0
Shale, soft				27	0	49	0
Sandstone				7	0	56	0
Fire clay				1	1	57	1
Sandstone				2	2	59	3
Fire clay and shale				6	1	65	4
Sandstone				1	8	67	0
Shale, sandy				1	4	68	4
Sandstone				1	8	70	0
Slate, black				12	1	82	1
Coal	1′	5″	Lower Iaeger	3	4	85	5
Coal and bone	0	10					
Binder	0	3½					
Bone	0	2¼					
Binder	0	2½					
Coal and bone	0	4½					
Fire clay				1	4	86	9
Shale, sandy				2	0	88	9
Sandstone				24	4	113	1
Sandstone, with coal spars				2	10	115	11
Sandstone and shale				3	3	119	2
Sandstone				16	10	136	0
Shale, dark, sandy				9	9	145	9
Sandstone and shale				10	3	156	0
Sandstone, hard				74	6	230	6
Sandstone and shale				29	6	260	0

	Thickness. Ft.	In.	Total. Ft.	In
Coal, Sewell (2269′ B.)	1	3	261	3
Fire clay, soft	2	9	264	0
Fire clay, hard	2	0	266	0
Shale, sandy	2	2	268	2
Sandstone and shale	11	0	279	2
Sandstone	14	11	294	1
Shale, dark	15	5	309	6
Coal, Welch	0	7	310	1
Fire clay	1	8	311	9
Shale, dark, sandy	2	0	313	9
Sandstone and shale	23	11	337	8
Shale, dark, sandy	34	8	372	4
Shale, light, sandy	4	8	377	0
Sandstone, hard	19	3	396	3
Shale, variegated	1	0	397	3
Shale, light, sandy	7	4	404	7
Sandstone and shale	2	7	407	2
Shale, dark, sandy	14	4	421	6
Shale, soft, dark	1	8	423	2
Shale, light, sandy	7	3	430	5
Shale, dark, sandy	2	7	433	0
Fire clay, hard	0	2	433	2
Shale, gray	0	9	433	11
Shale and clay	12	1	446	0
Shale, dark, sandy	19	9	465	9
Slate, black	0	10	466	7
Slate, black, with coal 0′ 10″; Coal, dirty 0 6 } Beckley	1	4	467	11
Fire clay, sandy	2	2	470	1
Shale, dark, sandy	24	7	494	8
Sandstone and shale	5	4	500	0
Sandstone, with shale streaks	8	3	508	3
Sandstone and shale	4	3	512	6
Shale, dark, sandy	9	6	522	0
Slate, black	0	2	522	2
Fire clay and shale	4	0	526	2
Slate, black, Fire Creek Coal horizon (2001′ B.)	2	5	528	7
Shale, soft	0	3	528	10
Shale, sandy	7	2	536	0
Sandstone	12	2	548	2
Coal, bony	0	1	548	3
Fire clay	0	10	549	1
Coal, bony, Little Fire Creek	0	3	549	4
Fire clay	0	8	550	0

Gauley Coal Land Co. Coal Test Boring No. 26—No. 26 on Map II.

Nicholas County, Kentucky District; on Taylor Run 1.3 miles south of mouth, 2.9 miles northeast of Lowland and 3.9 miles northwest of Fenwick; elevation, 2125′ B.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series—New River Group (230′+)				
Surface	6	0	6	0

	Thickness. Ft.	In.	Total. Ft.	In.
Sandstone	40	8	46	8
Sandstone and shale	20	0	66	8
Shale, sandy	6	2	72	10
Fire clay	2	7	75	5
Shale, sandy	3	0	78	5
Shale, dark	1	0	79	5
Coal, Castle	1	0½	80	5½
Fire clay	1	0½	81	6
Shale, sandy	4	0	85	6
Sandstone	6	0	91	6
Shale, sandy	46	4	137	10
Shale, light, sandy	3	4	141	2
Sandstone	4	0	145	2
Shale, dark, sandy	1	4	146	6
Sandstone	0	8	147	2
Shale, dark, sandy	4	5	151	7
Sandstone and shale	24	6	176	1
Sandstone, with slate streaks	7	1	183	2
Sandstone	9	0	192	2
Coal, bony 0′ 6½″				
Coal 0 5½				
Coal, bony 0 1				
Coal 3 2 — **Sewell** (1928′ B.)	5	0	197	2
Coal, with knife-edge streaks of slate 0 9				
Fire clay, sandy	2	10	200	0

Gauley Coal Land Co. Coal Test Boring No. 24—No. 27 on on Map II.

Nicholas County, Kentucky District; 2.6 miles west of Fenwick; elevation, 2600′ B.

Pottsville Series—New River Group (476′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	43	6	43	6
Sandstone, hard	31	8	75	2
Slate, black	0	1	75	3
Coal, dirty	0	4	75	7
Shale, dark	0	1	75	8
Shale, gray	9	4	85	0
Shale, dark	1	0	86	0
Shale, gray	3	7	89	7
Shale, dark, sandy	10	6	100	1
Shale, gray	3	5	103	6
Slate, black	0	4	103	10
Coal, dirty, **Lower Iaeger**	1	1	104	11
Slate, black	0	3	105	2
Shale, gray, sandy	6	2	111	4
Shale, dark, sandy	10	6	121	10
Sandstone, hard, **Lower Iaeger**	42	6	164	4
Shale, dark	4	6	168	10
Coal, dirty	0	2	169	0

	Thickness. Ft.	In.	Total. Ft.	In
Shale, dark	3	0	172	0
Sandstone, hard, Harvey	7	0	179	0
Shale, dark, gray	28	6	207	6
Slate, black, with coal spars, Castle?	2	9	210	3
Clay, shaly	0	9	211	0
Shale, gray	12	6	223	6
Shale, dark, sandy	21	3	244	9
Sandstone, hard, Guyandot?	32	3	277	0
Shale, dark, sandy	29	6	306	6
Coal, dirty, Sewell? (2293′ B.)	0	1	306	7
Shale, dark, sandy, with sand streaks	6	2	312	9
Sandstone, hard, with shale streaks	47	3	360	0
Sandstone, with coal spars	20	6	380	6
Coal	0	1	380	7
Sandstone, with coal streaks	2	11	383	6
Coal	0	2	383	8
Sandstone	0	1½	383	9½
Coal	0	1½	383	11
Sandstone, with coal spars	2	1	386	0
Coal	0	1	386	1
Sandstone, with coal spars	1	8½	387	9½
Coal	0	0½	387	10
Sandstone	0	0½	387	10½
Coal	0	3½	388	2
Sandstone, hard, with coal spars	5	0	393	2
Coal	0	3	393	5
Sandstone,	0	0½	393	5½
Coal	0	1½	393	7
Sandstone	0	5½	394	0½
Coal and sandstone mixed	0	3½	394	4
Sandstone	0	4½	394	8½
Coal	0	1	394	9½
Sandstone	0	10	395	7½
Coal, dirty	0	11½	396	7
Sandstone, with coal spars	0	1½	396	8½
Coal, clean	0	2	396	10½
Sandstone	0	3	397	1½
Coal	0	1	397	2½
Sandstone	0	2	397	4½
Coal	0	2½	397	7
Sandstone, with coal spars	0	6	398	1
Coal	0	1½	398	2½
Sandstone	0	0½	398	3
Coal	0	0½	398	3½
Sandstone, with coal spars	0	1½	398	5
Coal, dirty	0	3	398	8
Sandstone, with coal spars	0	6	399	2
Fire clay, sandy	4	1	403	3
Shale, light, sandy	11	7	414	10
Shale, dark, sandy	10	5	425	3
Sandstone	0	8	425	11
Shale, dark, sandy	0	3	426	2
Sandstone	3	5	429	7
Shale, dark, sandy	4	0	433	7
Sandstone	36	8	470	3
Shale, dark	5	9	476	0

Gauley Coal Land Co. Coal Test Boring No. 21—No. 27A on Map II.

Nicholas County, Kentucky District; 0.15 mile south of Lowland; elevation, 2190' ±.

Pottsville Series—New River Group (137' ±)			Thickness Ft.	In.	Total Ft.	In.
Surface			22	0	22	0
Shale, soft			2	0	24	0
Shale, dark, variegated			33	0	57	0
Shale, light, sandy			8	0	65	0
Slate, soft			0	1½	65	1½
Coal	0' 3"	Sewell "B"	1	3	66	4½
Slate, dark, with coal streaks	1 0					
Shale, dark, sandy			2	0	68	4½
Shale, dark, variegated			6	5½	74	10
Sandstone, light			1	11	76	9
Shale, dark, sandy			10	1	86	10
Shale, dark			1	7	88	5
Shale, dark, soft			1	3	89	8
Shale, dark			2	0	91	8
Shale, dark, sandy			4	7	96	3
Shale, gray, sandy			1	9	98	0
Sandstone			1	3	99	3
Shale, dark, sandy			0	11	100	2
Sandstone, hard, with coal spars			5	10	106	0
Sandstone			8	8	114	8
Shale, light and dark			14	10	129	6
Slate, black			0	0¼	129	6¼
Coal, bony	0' 1½"	Sewell (2057' ±)	3	5¼	132	11½
Coal, clean	1 4					
Coal, knife-edge layers of slate	1 11¾					
Fire clay, light			4	0½	137	0

The record of boring **No. 29** could not be found in the files of the Gauley Coal Land Company.

Gauley Coal Land Co. Coal Test Boring No. 23A—No. 30 on Map II.

Nicholas County, Kentucky District, 1.65 miles southwest of Saxman; elevation, 2580' B.

Pottsville Series—New River Group (177'+)	Thickness Ft.	In.	Total Ft.	In.
Surface	21	6	21	6
Shale, gray	39	2	60	8
Shale, soft, light	3	4	64	0
Shale, soft, gray	9	3	73	3
Shale, gray, sandy	16	0	89	3
Shale, soft, light	3	4	92	7
Shale, light, sandy	2	6	95	1
Sandstone, hard, Guyandot	56	9	151	10

	Thickness. Ft.	In.	Total. Ft.	In.
Coal, Sewell "A"	0	11	152	9
Fire clay, shaly	1	6	154	3
Shale, hard, dark	1	2	155	5
Sandstone, hard, with shale streaks	13	2	168	7
Sandstone and shale, dark	2	1	170	8
Shale, soft, gray	0	7½	171	3½
Slate	0	0½	171	4
Coal, Sewell (2407′ B.)	1	10	173	2
Shale, soft, dark	0	6½	173	8½
Fire clay, sandy	3	3½	177	0

Gauley Coal Land Co. Coal Test Boring No. 11—No. 31 on Map II.

Nicholas County, Kentucky District; on west bank of Jims Branch, 1.55 miles northwest of Tolbert and 1.4 miles south of Lowland; elevation, 2315′ B.

Pottsville Series—New River Group (138′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	12	0	12	0
Sandstone, hard	1	5	13	5
Shale, sandy, dark	1	0	14	5
Sandstone, Guyandot	12	1	26	6
Shale, sandy, dark	14	0	40	6
Sandstone	2	4	42	10
Shale, sandy, gray	8	2	51	0
Slate	1	6	52	6
Sewell "B": Coal, bony 0′ 5″; Slate, with coal streaks 0 6; Coal, bony 0 2; Slate 0 1; Slate and coal, bony 2 1; Coal 0 10	4	1	56	7
Slate and clay	0	6	57	1
Clay, soft	2	3	59	4
Shale, sandy, gray	5	0	64	4
Lower Guyandot: Sandstone and shale 11′ 1″; Sandstone, hard 32 1	43	2	107	6
Shale, gray, with hard streaks	23	4	130	10
Coal, Sewell (2181′ B.)	3	6½	134	4½
Fire clay	3	7½	138	0

Gauley Land Co. Coal Test Boring No. 2—No. 32 on Map II.

Nicholas County, Kentucky District; on Jims Branch of Panther Creek, 2.4 miles northeast from Tolbert; elevation, 2325′ B.

Pottsville Series (285′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	15	0	15	0
Shale, dark	37	4	52	4
Sandstone	3	6	55	10

	Thickness. Ft.	In.	Total. Ft.	In.
Slate, dark	4	2	60	0
Bone	0	5	60	5
Coal and slate	2	5	62	10
Coal, Sewell "B"?	1	4	64	2
Fire clay	0	10	65	0
Shale, light	9	6	74	6
Sandstone, hard, Lower Guyandot?	29	10	104	4
Shale, dark	6	0	110	4
Coal	1	4	111	8
Slate, dark	0	3	111	11
Coal	0	3	112	2
Slate, dark	0	4	112	6
Coal	0	1	112	7
Fire clay	3	4	115	11
Shale, dark	11	6	127	5
Slate, dark	0	4	127	9
Coal, Sewell (2194′ B.)	3	8	131	5
Fire clay	3	4	134	9
Sandstone	8	0	142	9
Shale, dark	8	2	150	11
Coal, Welch?	0	1	151	0
Fire clay	2	0	153	0
Shale, light	10	0	163	0
Shale, dark	14	0	177	0
Slate, dark	5	2	182	2
Coal, dirty, Welch?	0	8	182	10
Fire clay	0	10	183	8
Sandstone, Upper Raleigh	11	8	195	4
Shale, dark	51	5	246	9
Slate, dark	1	3	248	0
Fire clay	7	0	255	0
Sandstone, Lower Raleigh?	30	0	285	0

Gauley Coal Land Co. Coal Test Boring No. 25—No. 33 on Map II of Nicholas County Report.

Nicholas County, Kentucky District; on Little Laurel Creek, 2.1 miles northwest of Lowland and 2.15 miles north of Nettie; elevation, 2045′ B.

Pottsville Series (150′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	20	6	20	6
Sandstone	23	6	44	0
Shale, soft, dark	10	8	54	8
Slate and coal, Castle?	0	6	55	2
Shale, dark	3	8	58	10
Slate, with coal spars	1	4	60	2
Shale, sandy	10	0	70	2
Slate, soft, with coal spars	1	10½	72	0½
Slate and coal	0	1½	72	2
Slate, soft	0	2	72	4
Coal streaks and "mother coal"	0	8	73	0
Fire clay, soft	5	2	78	2

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, gray	4	0	82	2
Sandstone	6	0	88	2
Shale, sandy	10	6	98	8
Slate	27	2	125	10
Shale, light, sandy	8	2	134	0
Shale, sandy	9	3	143	3
Shale, soft	0	1	143	4
Coal, clean, with thin streaks of "mother coal," Sewell (1898')	3	4	146	8
Fire clay, sandy	3	4	150	0

Gauley Coal Land Co. Coal Test Boring No. 4—No. 37 on Map II.

Nicholas County, Kentucky District; on Hominy Creek, 0.9 mile northeast from Blacks Chapel School; elevation, 1660′ B.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (236′+)				
Surface	13	0	13	0
Shale, dark	10	0	23	0
Slate and coal	0	6	23	6
Sandstone and shale	11	7	35	1
Shale, dark	12	3	47	4
Coal	0	6	47	10
Fire clay	3	8	51	6
Sandstone	3	3	54	9
Sandstone and shale	13	4	68	1
Sandstone	4	0	72	1
Shale, dark	3	0	75	1
Sandstone	27	6	102	7
Slate, dark	6	1	108	8
Bone	0	4	109	0
Coal, dirty	0	8	109	8
Fire clay	1	6	111	2
Shale, dark	8	0	119	2
Coal, dirty	0	3	119	5
Shale, dark	11	3	130	8
Shale and sandstone	24	5	155	1
Fire clay, Sewell Coal horizon?	6	0	161	1
Shale, light	9	6	170	7
Sandstone, hard	30	5	201	0
Shale, dark	35	0	236	0

The record of coal test No. 38 was published in connection with the Fury Knob Section by Reger in the Nicholas County Report, pages 170-171. The Sewell Coal in that publication was reported as 4 feet 6 inches. However, it will be noted from this record that the bottom 2′ 2″ is given here as slate, streaked with coal, leaving only 2′ 4″ of clean coal at the top. The record of this hole as given below differs slightly in other particulars from that previously published:

Gauley Coal Land Co. Coal Test Boring No. 1—No. 38 on Map II.

Nicholas County, Kentucky District; at Deepwell P. O.; drilled by E. F. Saxman; authority, Gauley Coal Land Co.; elevation, 1800′ L.

	Thickness.		Total.	
Pottsville Series (640′+)	Ft.	In.	Ft.	In.
Surface	23	0	23	0
Shale and soapstone	21	9	44	9
Sandstone	4	6	49	3
Shale, light	1	8	50	11
Sandstone	3	4	54	3
Shale, light	17	0	71	3
Slate, black	2	9	74	0
Coal	0	9	74	9
Fire clay	8	0	82	9
Shale, light	3	11	86	8
Sandstone	0	6	87	2
Shale, dark	0	8	87	10
Sandstone	2	7	90	5
Shale, dark	0	9	91	2
Sandstone	2	6	93	8
Shale, dark	9	0	102	8
Sandstone	2	5	105	1
Shale, dark	1	8	106	9
Shale, dark	0	2	106	11
Coal .... 2′ 4″ Slate, streaked with coal .... 2 2 } Sewell (1689′ L.)	4	6	111	5
Fire clay	2	10	114	3
Shale, dark	29	2	143	5
Slate, streaked with coal	0	8	144	1
Shale, dark	3	8	147	9
Shale, light	9	0	156	9
Sandstone, hard	12	2	168	11
Shale, dark	13	6	182	5
Coal, dirty	1	2	183	7
Fire clay	2	2	185	9
Sandstone	9	7	195	4
Shale, dark	140	7	335	11
Sandstone	25	8	361	7
Sandstone, conglomerate	3	7	365	2
Fire clay	4	0	369	2
Shale, dark	6	6	375	8
Fire clay	8	0	383	8
Sandstone	54	0	437	8
Shale, dark	1	6	439	2
Sandstone	2	6	441	8
Shale, dark	2	0	443	8
Sandstone	14	10	458	6
Fire clay	2	10	461	4
Sandstone	20	6	481	10
Shale, light, sandy	1	3	483	1
Sandstone	1	0	484	4?

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, light, sandy	16	10	501	2
Sandstone	3	8	504	10
Shale, light, sandy	7	8	512	6
Sandstone	60	3	572	9
Shale, light, sandy	26	6	599	2?
Sandstone	30	4	629	6
Shale, dark	10	8	640	2

Gauley Coal Land Co. Coal Test Boring No. 13—No. 39 on Map II.

Nicholas County, Kentucky District; 0.75 mile north of Ophelia and 1.75 miles west of Nettie; elevation, 2162′ L.

Pottsville Series—New River Group (400′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	23	0	23	0
Shale, gray	21	0	44	0
Shale, light	0	6	44	6
Shale and coal, Castle	0	4	44	10
Shale and clay	1	0	45	10
Sandstone, Guyandot	30	2	76	0
Shale, dark	0	8	76	8
Coal, Sewell "B"	0	3	76	11
Shaly clay	2	6	79	5
Shale, dark	37	1	116	6
Sandstone	2	0	118	6
Shale, light	28	1	146	7
Slate, black	2	5	149	0
Coal, Sewell "A"?	1	1	150	1
Shale, dark	6	8	156	9
Coal 1′ 4½″; Coal, bony 0 2¼; Slate 0 0½; Cannelized slate 0 5¾ } Sewell (2003′ L.)	2	1	158	10
Sandy clay	6	2	165	0
Sandstone	3	8	168	8
Shale, dark	20	4	189	0
Coal, Welch	0	4	189	4
Fire clay, dark	1	8	191	0
Sandstone, hard, Upper Raleigh	21	0	212	0
Shale, dark	31	0	243	0
Fire clay, soft, Little Raleigh Coal horizon?	4	0	247	0
Shale, light	32	0	279	0
Sandstone, light, Lower Raleigh	20	0	299	0
Shale, dark	12	0	311	0
Sandstone, hard, dark	4	0	315	0
Sandstone, hard, light	9	6	324	6
Slate, gray	6	8	331	2
Coal, bony, Beckley?	0	5½	331	7½
Shale, gray	68	4½	400	0

Gauley Coal Land Co. Coal Test Boring No. 12—No. 40 on Map II.

Nicholas County, Kentucky District; 0.55 mile southeast of Ophelia and 1.2 miles northwest of Tolbert; elevation, 2715′ B.

	Thickness.		Total.	
Pottsville Series (615′+)	Ft.	In.	Ft.	In.
Surface	11	0	11	0
Shale, dark	7	0	18	0
Shale, sandy, gray	28	0	46	0
Shale, sandy, dark	27	6	73	6
Sandstone, **Lower Dotson**	19	6	93	0
Shale, sandy, dark	18	6	111	6
Slate, black	0	3	111	9
Coal, Lower Douglas	1	0½	112	9½
Fire clay	0	2½	113	0
Shale, dark, sandy	11	6	124	6
Sandstone, hard, gray, **Upper Nuttall**	50	0	174	6
Shale, dark	0	6	175	0
Sandstone	0	8	175	8
Slate, black	4	0	179	8
Sandstone, hard, gray	5	4	183	0
Coal	0	10	183	10
Clay, sandy	2	2	186	0
Shale, gray, with hard sand streaks	6	0	192	0
Shale, dark, with hard sand streaks	21	0	213	0
Shale, dark	26	6	239	6
Slate	0	7	240	1
Slate and bony **coal**	0	6	240	7
Shale, gray, with sand streaks	11	0	251	7
Shale, dark	6	3	257	10
Sandstone	0	7	258	5
Slate, black	5	5	263	10
Sandstone	0	8	264	6
Sandstone and shale	1	6	266	0
Sandstone, gray	6	0	272	0
Shale, dark-gray, mixed	8	4	280	4
Shale, dark	22	0	302	4
Coal, Hughes Ferry	0	7	302	11
Shale, gray, sandy	1	11	304	10
Fire clay	2	2	307	0
Shale, gray, sandy	10	0	317	0
Sandstone, hard, gray, with **coal** spars, **Middle Iaeger**	30	4	347	4
Slate	0	3	347	7
Clay, sandy	1	6	349	1
Shale, dark, sandy	11	5	360	6
Sandstone, gray	31	0	391	6
Shale, gray, sandy	11	6	403	0
Shale, dark	4	6	407	6
Coal, Lower Iaeger	0	10½	408	4½
Fire clay	0	7½	409	0
Sandstone, hard, **Lower Iaeger**	15	6	424	6
Shale, hard, dark	28	0	452	6
Shale, gray, sandy	11	0	463	6
Shale and sandstone, dark mixed	37	4	500	10

				Thickness.		Total.	
				Ft.	In.	Ft.	In.
Shale, dark				7	6	508	4
Slate				0	11	509	3
Coal, clean, Castle				1	11½	511	2½
Slate, soft				0	1	511	3½
Clay, sandy				0	2½	511	6
Slate, soft				0	1	511	7
Shale, sandy, with clay streaks				1	10	513	5
Sandstone, hard, **Guyandot**				32	3	545	8
Sandstone, with **coal** spars				3	0	548	8
Shale, dark				0	5	549	1
Sandstone, hard				4	5	553	6
Shale, hard, sandy				12	6	566	0
Shale, dark, with sand streaks				25	0	591	0
Sandstone, hard, **Lower Guyandot**				12	10	603	10
Coal, clean	0′	1½″					
Coal, dirty	0	1½					
Slate	0	0¾					
Coal, clean	0	3¼					
Sulphur ball, tapered	0	0½					
Coal, good, clean	1	9					
Coal, dirty	0	1¾	**Sewell**				
Slate, black	1	5	(2103′ B.)	7	9	611	7
Coal, good, clean	1	2¼					
Coal, knife-edge slate	0	2½					
Coal, good	0	7					
"Mother **coal**"	0	1					
Coal, good	0	7					
Coal, bony, hard	0	4¼					
Coal, good	0	9¾					
Fire clay, sandy				4	0	615	7

The following quotation is part of the core record:

"The above record is correct except Item 75, [third line from bottom of section (**Coal**, bony, hard....0′ 4¼″)] which I am satisfied fell into the hole while the drill was withdrawn on account of core barrel being full. I watched the drill cutting the core and when necessary to pull out, it was still in good coal. The drill rod was marked and when put back into the hole would not go down to the bottom by four inches, which was caused, in my opinion, by the piece of bony coal falling in from the side of the hole nearer the top. After the drill got down as deep as it was before being pulled out, it continued to cut soft coal for 9¾ inches before getting into hard stuff, and when drill was pulled out, the coal measured 9¾″. Core was in good shape. Coal looks good."

Gauley Coal Land Co. Coal Test Boring No. 19—No. 41 on Map II.

Nicholas County, Kentucky District; 1.05 miles northwest of Mayflower School; elevation, 2210′ B.

Pottsville Series—New River Group (311′+)				Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Surface				16	0	16	0
Shale, soft				7	0	23	0
Shale, gray, sandy				16	6	39	6
Shale, dark				51	8	91	2
Coal	1′	1″	Hughes Ferry	3	10½	95	0½
Coal, bony	0	3					
Clay, shaly	1	11½					
Coal, bony	0	1					
Slate	0	1½					
Sandstone	0	3					
Coal, bony	0	1½					
Shale, dark, sandy				0	4½	95	5
Fire clay				6	1	101	6
Clay, gray, shaly				1	5	102	11
Sandstone				1	3	104	2
Clay				0	1	104	3
Clay and coal mixed				0	2	104	5
Sandstone				0	6	104	11
Shale, dark, lime				2	6	107	5
Shale, dark				8	4	115	9
Shale, gray				13	0	128	9
Shale, gray, sandy				20	9	149	6
Shale, dark, sand streaks				7	4	156	10
Sandstone, mottled				15	2	172	0
Shale, dark, hard sand streaks				33	4	205	4
Coal, bony	0′	1″	Lower Iaeger (2003′ B.)	1	6	206	10
Coal	0	3					
Coal, bony	0	0½					
Coal	1	1½					
Clay, soft				0	4½	207	2½
Clay, sandy				0	3½	207	6
Shale, hard, dark, sandy				6	10	214	4
Sandstone, hard, Lower Iaeger				4	8	219	0
Shale, hard, dark				23	0	242	0
Coal				0	3	242	3
Clay, sandy				1	1	243	4
Shale, gray, sandy				3	4	246	8
Sandstone				1	3	247	11
Shale, dark, sandy				1	6	249	5
Sandstone, hard, Harvey				23	1	272	6
Shale, hard, dark, sandy streaks				25	2	297	8

				Thickness. Ft.	In.	Total. Ft.	In.
Coal	0′	3″	Castle (1908′ B.)	4	0¼	301	8½?
"Mother coal"	0	1					
Coal	0	3¾					
"Mother coal"	0	0¼					
Coal	0	8					
Variegated sandstone, with white and dark streaks	0	5½					
Slate, black	0	6¼					
Slate, black, with coal streaks	1	1					
Coal	0	7½					
Clay, light, sandy				1	8	303	4½
Shale, light, sandy				3	4	306	8½
Shale, dark, sandy				4	3½	311	0

Gauley Coal Land Co. Coal Test Boring No. 3—No. 43 on Map II.

Nicholas County, Kentucky District; on Deer Creek, 0.7 mile southeast from Trimble School; elevation, 2055′ B.

Pottsville Series—New River Group (445′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	20	0	20	0
Sandstone, Upper Nuttall	16	0	36	0
Fire clay	6	0	42	0
Shale, dark	95	0	137	0
Slate, gray	6	0	143	0
Coal, bony, Hughes Ferry	0	2	143	2
Slate, soft	3	8	146	10
Fire clay	2	6	149	4
Sandstone	2	4	151	8
Fire clay	1	2	152	10
Sandstone	76	9	229	7
Slate, dark	3	3	232	10
Bone	0	4	233	2
Coal, Lower Iaeger	1	0	234	2
Slate and coal	1	4	235	6
Fire clay	0	5	235	11
Shale, dark	2	9	238	8
Shale, light	9	7	248	3
Shale, dark	15	3	263	6
Sandstone	18	10	282	4
Sandstone and shale	17	6	299	10
Shale, dark	10	6	310	4
Sandstone	2	0	312	4
Shale, dark	3	0	315	4
Coal, Castle	1	10	317	2
Slate, soft	0	10	318	0
Fire clay	5	0	323	0
Shale, dark	12	3	335	3
Sandstone	4	5	339	8
Shale, light	17	3	356	11
Shale, dark	18	0	374	11

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, light	5	3	380	2
Sandstone	5	7	385	9
Shale, dark	10	6	396	3
Shale, light	9	7	405	10
Slate, dark	2	0	407	10
Coal, Sewell "A"	0	6	408	4
Fire clay	2	4	410	8
Shale and sandstone	6	2	416	10
Shale, dark	23	0	439	10
Coal, Sewell (1613′ B.)	2	2	442	0
Slate, streaked with **coal**	2	7	444	7
Fire clay	0	10	445	5

Gauley Coal Land Co. Coal Test Boring No. 27—No. 44 on Map II.

Nicholas County, Kentucky District; on Hughey Branch of Deer Creek, 3.15 miles northeast of Deepwell, and 3.05 miles northwest of Nettie; elevation, 2225′ B.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series—Kanawha Group (38′+)				
Surface	11	0	11	0
Sandstone	2	0	13	0
Shale and clay	8	0	21	0
Sandstone, with **coal** spars	3	8	24	8
Coal, Lower Douglas	0	1	24	9
Fire clay, sandy	2	3	27	0
Shale, dark, sandy	11	0	38	0
Pottsville Series—New River Group (412′+)				
Sandstone, **Upper Nuttall**	67	2	105	2
Slate, soft, black	0	4½	105	6½
Coal, dirty, Iaeger "B"	0	3½	105	10
Fire clay	2	10	108	8
Shale, gray	3	4	112	0
Shale, sandy	26	0	138	0
Shale, dark, and slate	38	2	176	2
Slate, with **coal** spars, **Iaeger "A"**	1	9	177	11
Fire clay	0	11	178	10
Shale, sandy	6	4	185	2
Sandstone	13	0	198	2
Shale, sandy	2	0	200	2
Shale, gray	12	8	212	10
Shale, dark	0	1	212	11
Shale, gray	1	5	214	4
Shale, dark	0	7	214	11
Shale, gray	6	0	220	11
Sandstone and shale	3	10	224	9
Sandstone	47	6	272	3
Coal, Lower Iaeger?	1	1	273	4
Sandstone	7	3	280	7
Shale, dark, with sand streaks	8	6	289	1
Shale, dark	13	7	302	8
Coal, Lower Iaeger?	1	3	303	11
Shale, dark	5	0	308	11

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, dark, sandy	3	6	312	5
Sandstone	5	0	317	5
Shale, dark	14	3	331	8
Sandstone	14	6	346	2
Shale and sandstone, dark	42	7	388	9
Sandstone	1	0	389	9
Coal, clean 1′ 11″; "Mother coal" 0 1; **Coal**, clean 0 3 — **Castle** (1833′ B.)	2	3	392	0
Fire clay	8	0	400	0
Shale, dark, sandy	4	0	404	0
Sandstone	18	4	422	4
Shale, dark	27	8	450	0

Gauley Coal Land Co. Coal Test Boring No. 16—No. 45 on Map II.

Nicholas County, Kentucky District; 0.5 mile west-southwest of Odell School; elevation, 2400′ B.

Pottsville Series—New River Group (392′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	27	0	27	0
Sandstone, hard	0	10	27	10
Shale, soft, light	9	2	37	0
Shale, light, sandy	16	4	53	4
Coal, bony, **Iaeger "A"**	0	7	53	11
Shale, light	1	3	55	2
Sandstone, hard	7	2	62	4
Shale, light	18	2	80	6
Sandstone, hard	15	0	95	6
Sandstone, mottled	1	0	96	6
Sandstone, dark	0	3	96	9
Coal, Hughes Ferry	0	4	97	1
Shale, dark	0	3	97	4
Shale, light	1	6	98	10
Sandstone, hard	44	2	143	0
Shale, dark, with white streaks	15	9	158	9
Shale, dark, sandy	2	4	161	1
Coal, and slate, laminated, **Lower Iaeger**	10	7	171	8
Shale, dark, with white streaks	9	2	180	10
Shale, dark	33	8	214	6
Coal, dirty	0	8	215	2
Shale, gray	15	7	230	9
Fire clay, hard	2	0	232	9
Slate, black	1	3	234	0
Shale, gray, sandy	20	0	254	0
Sandstone, hard, **Guyandot**	67	0	321	0
Shale, gray	30	6	351	6
Slate, black	2	0	353	6
Coal, Sewell "A"	1	1	354	7
Fire clay, dark	0	6	355	1
Shale, gray	23	1	378	2
Sandstone	1	5	379	7
Shale, gray	1	8	381	3

	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Slate, black	0	1	381	4
Coal, clean .... 2′ 7½″ Sewell				
Coal, laminated .... 0 2½ (2016′ B.)	2	10	384	2
Slate, laminated	1	2	385	4
Shale, dark	6	8	392	0

Gauley Coal Land Co. Coal Test Boring No. 14—No. 46 on Map II.

Nicholas County, Kentucky District; 1.6 miles northwest of Hominy Mill and 0.75 mile southeast of Odell School; completed, June 28, 1917; elevation, 2300′±.

Pottsville Series—New River Group (196′+)	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Surface	6	6	6	6
Sandstone, hard, Guyandot	31	0	37	6
Shale, hard, dark	33	6	71	0
Sandstone, hard, mottled	2	0	73	0
Slate, black	0	4	73	4
Coal, Sewell "A"	1	1	74	5
Shaly fire clay	1	1	75	6
Shale, dark	2	0	77	6
Sandstone, Lower Guyandot	6	0	83	6
Shale, dark, sandy	12	6	96	0
Coal .... 2′ 3″; Slate parting .... 0 1½; Coal, bony .... 0 8½ — Sewell (2201′ ±)	3	1	99	1
Shale, dark	0	4	99	5
Fire clay	3	4	102	9
Shale, dark, soft	12	3	115	0
Slate, black	7	0	122	0
Coal, dirty, Welch	1	1	123	1
Fire clay, shaly	1	5	124	6
Shale, dark	10	0	134	6
Shale, dark, sandy	45	0	179	6
Shale, dark	16	6	196	0

Gauley Coal Land Co. Coal Test Boring No. 15—No. 46A on Map II.

Nicholas County, Kentucky District; 1 mile northeast of Hominy Mill and 1 mile southwest of Tolbert; completed, Aug. 2, 1917; elevation, 2600′±.

Pottsville Series—New River Group (419′+)	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Surface	5	0	5	0
Shale, soft	6	0	11	0
Shale, soft, dark	11	6	22	6
Sandstone	26	4	48	10
Shale, variegated	28	8	77	6
Sandstone, hard	30	6	108	0
Shale, gray	42	9	150	9
Coal, Hughes Ferry	0	7	151	4

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, gray	2	4	153	8
Sandy shale	4	10	158	6
Slate, black	0	4	158	10
Shale, dark, gray	2	0	160	10
Fire clay, shaly	2	8	163	6
Shale, light, sandy	6	0	169	6
Shale, dark, sandy	20	4	189	10
Sandstone	3	0	192	10
Shale, dark	13	8	206	6
Fire clay, shaly	6	4	212	10
Shale, dark, hard, with hard sandstone streaks	18	2	231	0
Sandstone, hard, mottled	29	0	260	0
Shale, dark, sandy	2	0	262	0
Sandstone, hard	12	6	274	6
Shale, gray	14	6	289	0
Sandstone, hard, with coal streaks	26	0	315	0
Shale, gray	3	0	318	0
Sandstone, hard	16	3	334	3
Shale, light, sandy	1	6	335	9
Sandstone, hard, with coal streaks	45	3	381	0
Sandstone, with shale	27	7	408	7
Coal, clean, Sewell "A"?	1	6	410	1
Fire clay, sandy	0	6	410	7
Shale, sandy	3	10	414	5
Slate	0	3	414	8
Coal, clean, Sewell (2183'±)	2	1¾	416	9¾
Fire clay, sandy	2	2¼	419	0

The following record of boring No. 46B appears to be the same as the record of the depth and thickness of the Sewell Coal given for boring No. 48 as published in the Nicholas County Report, page 432. However, the location of No. 48 given in that report and shown on Map II in this report is one mile southwest of the location for No. 46B:

Gauley Coal Land Co. Coal Test Boring No. 8—No. 46B on Map II.

Nicholas County, Kentucky District; on Grassy Creek, on John Collison, near Grassy Creek School; authority, Gauley Coal Land Company; elevation, 2375'±.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (665'+)				
Sand, gravel, and boulders	15	0	15	0
Sandstone	19	0	34	0
Shale, dark	9	6	43	6
Sandstone	34	6	78	0
Coal 3' 9"; Bony parting 0 1; Coal 0 6 — Sewell (2293'±)	4	4	82	4
Fire clay	6	9	89	1

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Slate, black	2	2	91	3
Fire clay	3	2	94	5
Shale, gray, sandy	8	2	102	7
Shale, dark	16	3	118	10
Slate, black	0	8	119	6
Coal, Welch	0	7	120	1
Slate, black	0	8	120	9
Sandstone	18	0	138	9
Shale, dark, sand streaks	20	0	158	9
Shale, dark	39	5	198	2
Coal, Little Raleigh?	0	3	198	5
Fire clay	8	0	206	5
Shale, gray	22	10	229	3
Sandstone	7	0	236	3
Shale, dark	2	6	238	9
Sandstone	9	4	248	1
Shale, dark	1	7	249	8
Sandstone	3	0	252	8
Shale, dark	3	0	255	8
Shale, gray	6	6	262	2
Sandstone	5	6	267	8
Shale, gray	9	0	276	8
Fire clay, impure	3	0	279	8
Shale, dark	15	5	295	1
Slate, black	13	11	309	0
Coal	0	6	309	6
Slate, gray	2	0	311	6
Bone	0	3	311	9
Coal, Beckley?	0	6	312	3
Fire clay	6	3	318	6
Shale, gray	3	0	321	6
Shale, dark	12	2	333	8
Sandstone	10	9	344	5
Shale, dark	1	10	346	3
Sandstone	6	5	352	8
Shale, dark	2	10	355	6
Fire clay	3	0	358	6
Shale, dark	2	6	361	0
Coal, bony, Fire Creek? (2014′±)	0	7	361	7
Fire clay	8	0	369	7
Shale, gray	3	5	373	0
Shale, dark	11	10	384	10
Shale, gray	20	0	404	10
Fire clay	6	6	411	4
Shale, gray	3	4	414	8
Shale, dark	1	6	416	2
Fire clay	7	4	423	6
Sandstone	8	0	431	6
Shale, dark	2	10	434	4
Sandstone	1	10	436	2
Shale, gray	15	10	452	0
Slate, black	0	6	452	6
Coal	0	6	453	0
Fire clay	4	0	457	0
Shale, gray	8	4	465	4
Sandstone	16	0	481	4

	Thickness. Ft.	In.	Total. Ft.	In.
Slate, dark	3	6	484	10
Fire clay	2	8	487	6
Sandstone	6	0	493	6
Shale, gray	7	3	500	9
Slate, gray	6	3	507	0
Coal, bony	1	7	508	7
Fire clay	1	8	510	3
Shale, gray	6	0	516	3
Slate, dark	3	3	519	6
Coal, bony, No. 6 Pocahontas? (1755′±)	0	5	519	11
Fire clay	14	0	533	11
Sandstone	30	10	564	9
Shale, dark	1	9	566	6
Sandstone	3	6	570	0
Slate, dark	16	0	586	0
Coal, bony	0	10	586	10
Fire clay, dark	1	6	588	4
Coal, bony	0	5	588	9
Fire clay	5	9	594	6
Sandstone	6	3	600	9
Shale, dark	0	9	601	6
Sandstone	0	6	602	0
Shale, dark	0	9	602	9
Sandstone	1	0	603	9
Shale, dark	37	3	641	0
Sandstone, conglomerate	0	10	641	10
Fire clay, impure	6	0	647	10
Shale, gray	4	0	651	10
Sandstone, conglomerate	13	2	665	0

Gauley Coal Land Co. Coal Test Boring No. 22A—No. 46C on Map II.

Nicholas County, Kentucky District; 1.1 miles east of Tolbert; elevation, 2480′±.

Pottsville Series—New River Group (289′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	20	0	20	0
Sandstone	6	0	26	0
Shale, soft, light	10	0	36	0
Shale, light, sandy	39	3	75	3
Sandstone, hard, Guyandot	68	4	143	7
Shale, hard, dark, with sandstone streaks	37	10	181	5
Coal, clean 1′ 1″; Slate 0 0½; "Mother coal" 0 0½; Coal and thin layers of "mother coal" 1 9; "Mother coal" 0 0½; Coal 0 0½; "Mother coal" 0 0½; Coal, clean 0 6½ — Sewell (2295′±)	3	7	185	0
Clay, sandy	4	0	189	0
Sandstone, Welch	10	5	199	5

	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Shale, soft	0	5	199	11
Shale, dark	0	6	200	5
Clay, sandy	2	0	202	5
Shale, dark, hard	11	4	213	9
Slate, gray	18	3	232	0
Coal, Welch	0	7	232	7
Clay, dark, soft	2	0	234	7
Sandstone, hard, Upper Raleigh	22	6	257	1
Shale, dark	31	11	289	0

Gauley Coal Land Co. Coal Test Boring No. 29—No. 47 on Map II.

Nicholas County, Kentucky District; 2.2 miles east-southeast of Leivasy; elevation, 2740′ B.

Pottsville Series—New River Group (227′+)	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Surface	27	6	27	6
Shale, dark	18	4	45	10
Shale, soft, gray	12	9	58	7
Shale, dark, sandy	8	8	67	3
Shale, soft, gray	16	1	83	4
Shale, gray, sandy	3	8	87	0
Sandstone	1	1	88	1
Shale, sandy	4	0	92	1
Slate	0	2	92	3
Coal, bony, Castle	0	1	92	4
Fire clay, shaly	1	2	93	6
Shale, gray, sandy	9	2	102	8
Sandstone and shale	8	3	110	11
Shale, soft, gray	2	0	112	11
Shale, dark	5	0	117	11
Slate, black	0	4	118	3
Slate and coal mixed	0	6	118	9
Shale, dark, sandy	2	11	121	8
Sandstone, hard	28	6	150	2
Shale, dark, sandy	6	4	156	6
Sandstone	4	9	161	3
Shale, dark, sandy	16	6	177	9
Shale, light, sandy	4	0	181	9
Shale, dark, sandy	36	3	218	0
Slate, black	0	7	218	7
Coal, Sewell (2518′ B.)	3	2	221	9
Fire clay, sandy	5	3	227	0

Gauley Coal Land Co. Coal Test Boring No. 17—No. 48 on Map II.

Nicholas County, Kentucky District; 1.5 miles east of Hominy Mill and 0.45 mile southeast of Grassy Falls; completed, Aug. 17, 1917; elevation, 2420′ B.

Pottsville Series—New River Group (142′+)	Thickness. Ft.	Thickness. In.	Total Ft.	Total In.
Surface	20	0	20	0

	Thickness. Ft.	In.	Total. Ft.	In.
Clay and shale	5	0	25	0
Sandstone and gray shale streaks	12	0	37	0
Sandstone, hard	39	2	76	2
Shale, gray	1	5	77	7
Sandstone, gray, mottled	0	4	77	11
Shale, gray	1	0	78	11
Sandstone, hard	15	1	94	0
Shale, gray	1	0	95	0
Sandstone, hard	9	4	104	4
Shale, gray	13	6	117	10
Sandstone, light	7	1	124	11
Shale, gray	9	1	134	0
Slate, black	0	3	134	3
Coal 1′ 1½″				
Slate, gray 0 2¾ Sewell				
Coal 1 4½ (2283′ B.)	3	2	137	5
"Mother coal" 0 0¼				
Coal 0 5				
Fire clay, dark	1	5	138	10
Fire clay, light	2	8	141	6

Gauley Coal Land Co. Coal Test Boring No. 18—No. 49 on Map II.

Nicholas County, Kentucky District; 1.3 miles northeast of Grassy Creek School, and 1.9 miles northwest of Eureka School; completed, Aug. 13, 1917; elevation, 2510′ B.

Pottsville Series—New River Group (151′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	14	0	14	0
Shale, gray	20	0	34	0
Sandstone	1	0	35	0
Shale, gray	4	6	39	6
Fire clay, shaly	4	3	43	9
Slate	0	11	44	8
Coal, bony	0	4	45	0
Fire clay, shaly	2	0	47	0
Slate, black	0	7	47	7
Fire clay, shaly	6	9	54	4
Coal, bony, Castle	0	6	54	10
Clay, shaly	4	0	58	10
Shale, gray, sandy	6	0	64	10
Shale, gray, soft	17	8	82	6
Shale, dark, sandy	9	2	91	8
Shale, light, sandy	19	6	111	2
Shale, dark	20	3	131	5
Sandstone	2	8	134	1
Shale, dark, sandy	10	2	144	3
Coal 1′ 6″				
Fire clay binder 0 4 Sewell				
Coal 0 4½ (2362′ B.)	4	0	148	3
"Mother coal" 0 1				
Coal 1 8½				
Fire clay	2	9	151	0

Gauley Coal Land Co. Coal Test Boring No. 6—No. 50 on Map II.

Nicholas County, Wilderness District; on Hominy Creek, 1.8 miles south from Hominy Falls; completed, May 26, 1916; elevation, 2375′ B.

	Thickness.		Total.	
Pottsville Series (384′+)	Ft.	In.	Ft.	In.
Surface	7	0	7	0
Shale, dark	4	3	11	3
Sandstone	14	3	25	6
Shale, black	4	0	29	6
Coal, Welch	1	4	30	10
Fire clay, impure	0	8	31	6
Sandstone	14	0	46	6
Shale, gray	17	0	63	6
Shale, dark	39	0	102	6
Slate, black	5	0	107	6
Fire clay, impure	4	9	112	3
Shale, dark	3	0	115	3
Sandstone	1	6	116	9
Slate, gray	1	5	118	2
Coal, Little Raleigh	0	8	118	10
Fire clay, impure	13	0	131	10
Slate, gray	25	6	157	4
Slate, black	16	4	173	8
Slate, gray	10	4	184	0
Slate, black	1	0	185	0
Coal, bony	0	2	185	2
Sulphur	0	1	185	3
Coal	0	4	185	7
Slate, dark	61	9	247	4
Coal, bony	0	1	247	5
Shale, dark	0	8	248	1
Sandstone	16	11	265	0
Slate, black	1	6	266	6
Coal, Fire Creek?	1	11	268	5
Slate parting	0	3	268	8
Coal, bony	0	7	269	3
Fire clay	3	7	272	10
Slate, dark	10	3	283	1
Fire clay, impure	4	0	287	1
Shale, gray	8	0	295	1
Sandstone	8	4	303	5
Shale, dark	1	6	304	11
Fire clay	6	2	311	1
Slate, black	1	5	312	6
Sandstone	0	6	313	0
Coal	0	3	313	3
Slate, black	0	3	313	6
Fire clay	1	8	315	2
Shale, dark	30	3	345	5
Fire clay	17	7	363	0
Sandstone	21	0	384	0

Gauley Coal Land Co. Coal Test Boring No. 7—No. 51 on Map II.

Nicholas County, Wilderness District; on Hominy Creek near the mouth of Price Fork; completed, June 23, 1916; elevation, 2435′ B.

	Thickness.		Total.	
Pottsville Series (385′+)	Ft.	In.	Ft.	In.
Surface	27	0	27	0
Shale, dark	1	0	28	0
Sandstone	25	4	53	4
Shale, dark	72	1	125	5
Slate, black	2	0	127	5
Fire clay	2	0	129	5
Shale, sandy, gray	25	0	154	5
Sandstone, crystallized, very hard	34	6	188	11
Shale, dark	5	2	194	1
Sandstone, hard	6	11	201	0
Coal, Fire Creek?	0	5	201	5
Fire clay	3	0	204	5
Shale, gray	10	0	214	5
Slate, dark	3	0	217	5
Coal	0	7	218	0
Slate	0	9	218	9
Coal	0	4	219	1
Fire clay	8	6	227	7
Sandstone	4	6	232	1
Shale, gray	3	5	235	6
Slate, black	1	8	237	2
Shale, dark	10	6	247	8
Fire clay	4	0	251	8
Shale, gray	4	9	256	5
Sandstone	25	1	281	6
Coal, No. 8 Pocahontas?	0	4	281	10
Fire clay	1	0	282	10
Sandstone	5	6	288	4
Shale, dark	1	6	289	10
Sandstone	1	0	290	10
Slate, black	2	10	293	8
Coal	0	4	294	0
Fire clay	3	0	297	0
Shale, gray	2	0	299	0
Slate, gray	2	6	301	6
Coal, bony	1	4	302	10
Fire clay	2	10	305	8
Coal	0	4	306	0
Fire clay	1	8	307	8
Sandstone	6	8	314	4
Slate, gray	4	2	318	6
Coal	0	4	318	10
Sulphur band	0	1	318	11
Coal	0	7	319	6
Fire clay	4	3	323	9
Shale, gray	10	0	333	9
Sandstone	3	10	337	7
Slate, dark	0	8	338	3
Coal	0	2	338	5
Slate	0	1	338	6

	Thickness. Ft.	In.	Total. Ft.	In.
Coal, bony	0	5	338	11
Fire clay	4	7	343	6
Shale, dark	2	8	346	2
Sandstone (6′ 9″ marked with coal spar)	30	4	376	6
Shale, gray	1	11	378	5
Sandstone	0	2	378	7
Shale, light	6	9	385	4

Gauley Coal Land Co. Coal Test Boring No. 5—No. 52 on Map II.

Nicholas County, Wilderness District; in Anglins Creek, 1.1 miles north-northeast from Sugargrove School; elevation, 2090′ B.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (137′+)				
Surface	12	0	12	0
Shale, light	19	10	31	10
Shale, dark	1	0	32	10
Fire clay	4	0	36	10
Shale, light	17	10	54	8
Slate, dark	0	8	55	4
Coal, Fire Creek?	0	9	56	1
Fire clay	2	0	58	1
Shale, light	3	0	61	1
Sandstone	5	0	66	1
Shale, light	2	0	68	1
Sandstone	0	9	68	10
Coal, Little Fire Creek?	0	3	69	1
Shale, dark	11	0	80	1
Sandstone	27	5	107	6
Sandstone	12	0	119	6
Slate, soft	3	2	122	8
Fire clay	15	0	137	8
Mauch Chunk Series—Bluestone Group (37′+)				
Shale, red	11	0	148	8
Sandstone	14	0	162	8
Shale, red	2	6	165	2
Shale, light	2	0	167	2
Shale, red	3	0	170	2
Shale, light	1	0	171	2
Shale, red	1	0	172	2
Shale, light	1	0	173	2
Shale, red	1	10	175	0

DETAILED COAL TEST RECORDS, FAYETTE COUNTY.

There have been drilled some 50 core tests for coal in eastern Fayette County, the complete records of most of which were not available for use in the State Survey's report on that county. The complete records of 39 of these tests are now available for publication. Mr. Ray V. Hennen, author of the

Fayette County Report, had access to 28 of these records for study, but only 7 of which were available for publication. (See comments preceding Nos. 93, 93B, 93C, 93D, 111, 119, and 120.) The elevations and some details of the other 21 tests were given in that report in the table of "Summarized Records of Borings," pages 388B and 388C.

Since, therefore, many of these records are now available in full detail and since they are important in correlating the Greenbrier County coals, it is considered advisable to publish them in this report.

The junior author is responsible for the correlation of all records not previously published by the Survey.

The records of borings Nos. 93, 93B, 93C, and 93D with comments by Ray V. Hennen are reprinted from pages 443-446 of the Fayette County Report.

"The four following records of coal test borings were kindly furnished the Survey by C. E. Krebs of Charleston, W. Va., the correlation of the coal beds being determined by the author (Ray V. Hennen):"

Brackens Creek Coal & Land Company Coal Test Boring No. 2 —No. 93 on Fayette County Map II. (Not Shown on Map II.)

Fayette County, Sewell Mountain District; on waters of Brackens Creek, on hillside just southeast of road fork, 1.4 miles N. 75° W. of Shelton Schoolhouse; 1.25 miles west of 80° 55′ and 2.5 miles north of 38° 00′; by Brackens Creek Coal & Land Company, authority, with C. E. Krebs; completed in 1913; elevation, 2357′ L.

	Thickness.		Total.	
Pottsville Series (365′+)	Ft.	In.	Ft.	In.
Surface	5	6	5	6
Sandstone 6′ 7″; Shale, sandy 0 8; Sandstone 27 7; Sand, shaly 0 11; Sandstone 15 3 — Guyandot	51	0	56	6
Shale, blue, sandy	67	4	123	10
Shale, soft	1	2	125	0
Slate, coal partings, Sewell "A"	1	0	126	0
Sandstone, shale partings	8	9	134	9
Shale, sandy	5	6	140	3
Fire clay	5	1	145	4
Shale, sandy, blue	3	4	148	8
Sandstone	1	4	150	0
Shale, sandy	3	0	153	0
Sandstone	1	8	154	8
Shale, sandy	1	9	156	5
Sandstone	0	8	157	1
Shale, sandy	0	2	157	3

				Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Sandstone				0	5	157	8
Shale, soft				0	2	157	10
Coal	1′	1″	Sewell				
Slate and coal parting	0	5½	Sewell	1	6½	159	4½
Fire clay				1	10	161	2½
Shale, sandy				24	10½	186	1
Shale, dark-blue				38	1	224	2
Shale, sandy				0	4	224	6
Sandstone and coal partings	6′	7″	Upper Raleigh				
Shale, sandy	6	6					
Shale, black, and coal partings	5	11					
Shale, sandy	28	0		85	8	310	2
Sandstone	6	4					
Sandstone, coal partings	14	8					
Shale, sandy	17	8					
Coal and slate, Little Raleigh				0	7	310	9
Shale, sandy				20	0	330	9
Shale, blue				3	6	334	3
Slate and coal partings				0	2	334	5
Fire clay				1	3	335	8
Sandstone, Lower Raleigh, to bottom				29	4	365	0

Brackens Creek Coal & Land Company Coal Test Boring No. 4—No. 93B on Map II.

Fayette County, Sewell Mountain District; on south branch of Brackens Creek, 1.8 miles S. 35° W. of Russellville; by Brackens Creek Coal & Land Company, authority, with C. E. Krebs; elevation, 2124′ L.

Pottsville Series (247′+)				Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Surface				14	9	14	9
Sandstone, soft, and shale				24	3	39	0
Sandstone, Guyandot				13	3	52	3
Coal, Sewell "B"				0	6	52	9
Fire clay				1	6	54	3
Shale, sandy				20	9	75	0
Shale, blue				17	7	92	7
Fire clay				1	4	93	11
Sandstone				5	7	99	6
Shale, blue				16	4	115	10
Shale, black				0	8	116	6
Shale, blue				0	8	117	2
Shale, black				1	3	118	5
Coal, Sewell "A"				0	4	118	9
Shale, sandy				6	0	124	9
Shale, dark				16	9	141	6
Coal	0′	2″	Sewell				
Slate	0	1	Sewell	2	5½	143	11½
Coal	1	5					
Slate and coal	0	10½					

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, black	0	7	144	6½
Sandstone, shaly, Welch	50	5½	195	0
Coal and slate, Welch	0	8	195	8
Shale, sandy	29	6	225	2
Sandstone, with shale partings 3' 4"; Sandstone 19 0 } Upper Raleigh	22	4	247	6

Brackens Creek Coal & Land Company Coal Test Boring No. 1 —No. 93D on Fayette County Map II. (Not Shown on Map II.)

Fayette County, Sewell Mountain District; on hillside 0.28 mile S. 45° W. from Shelton Schoolhouse and 1.75 miles northeast of Clifftop; 0.1 mile west of 80° 55′ and 1.93 miles north of 38° 00′; by Brackens Creek Coal & Land Company, authority, with C. E. Krebs; completed, Dec. 24, 1912; elevation, 2431′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (300′+)				
Surface	12	11	12	11
Shale	14	6	27	5
Shale, sandy	36	0	63	5
Sandstone	10	6	73	11
Shale, dark	23	0	96	11
Sandstone	14	6	111	5
Shale, sandy	5	6	116	11
Shale, dark	35	0	151	11
Coal, bone, Sewell "A"	0	3	152	2
Clay	5	0	157	2
Sandstone, Lower Guyandot	24	5	181	7
Coal, bone 0′ 2″; Coal 0 11 } Sewell	1	1	182	8
Fire clay	2	6	185	2
Sandstone	12	0	197	2
Shale	32	10	230	0
Sandstone	20	0	250	0
Shale, sandy	10	0	260	0
Sand and shale	26	1	286	1
Bone	0	1	286	2
Sandstone and coal partings	4	6	290	8
Shale, sandy	9	4	300	0

Brackens Creek Coal & Land Company Coal Test Boring No. 3 —No. 93C on Fayette County Map II. (Not Shown on Map II.)

Fayette County, Sewell Mountain District; on a branch of Brackens Creek, southeast of Hogpen Ridge, 0.9 mile N. 15° W. of Shelton Schoolhouse, and 2.6 miles N. 15° E. of Clifftop; 0.35 mile west of 80° 55′ and 2.82 miles north of 38° 00′; by Brackens Creek Coal & Land Company, authority, with C. E. Krebs; completed, Jan. 9, 1913; elevation, 2345′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (229′+)				
Surface	12	4	12	4
Sandstone, Harvey Conglomerate	61	2	73	6

				Thickness. Ft.	In.	Total. Ft.	In.
Shale				10	6	84	0
Sandstone				2	1	86	1
Shale, dark				19	3	105	4
Coal, Castle				0	2	105	6
Clay				1	3	106	9
Sandstone	6′	0″					
Shale, sandy	4	0					
Sandstone	0	10					
Shale, sandy	3	7					
Sandstone	1	0	Guyandot	38	9	145	6
Shale, dark	1	0					
Sandstone	3	9					
Shale	0	5					
Sandstone	18	2					
Coal and bone, Sewell "B"				0	6	146	0
Fire clay				2	0	148	0
Sandstone				4	0	152	0
Shale, sandy				17	2	169	2
Sandstone				4	0	173	2
Shale, dark				26	6	199	8
Sandstone				7	6	207	2
Shale, dark				16	10	224	0
Coal	0′	11½″					
Parting	0	8¼	**Sewell**	3	6¼	227	6¼
Coal	1	10½					
Slate, to bottom				1	5¾	229	0

The record of boring **No. 94**, drilled on the property of Charles White, was not obtained.

The records of borings **Nos. 95 and 96**, drilled on the property of the Nuttall Heirs, were not obtained.

The record of boring **No. 97**, drilled on the property of Jno. Jordan-Amick, was not obtained.

The following record is reprinted from pages 446-447 of the Fayette County Report:

Beury Coal Test Boring No. 3—No. 111 on Map II.

Fayette County, Sewell Mountain District; on east bank of Laurel Creek, southeast of Pine Grove Schoolhouse, 2.7 miles S. 75° E. of Landisburg; by New River & Pocahontas Consolidated Coal Company; authority, J. S. Cunningham; elevation, 2545′ L.

Pottsville Series (300′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	10	0	10	0
Shale	10	0	20	0
Sandstone, **Lower Raleigh**	90	0	110	0
Slate	0	10	110	10
Coal, Beckley (2434′ L.)	0	5	111	3

				Thickness. Ft.	In.	Total. Ft.	In.
Slate				0	9	112	0
Sandstone	16′	0″	Quinnimont				
Shale	20	6		47	0	159	0
Sandstone	10	6					
Sandstone and shale				16	0	175	0
Shale, Quinnimont				68	6	243	6
Coal, Fire Creek(?) (2297′ L.)				3	10	247	4
Sandstone				6	0	253	4
Shale				8	0	261	4
Coal, Little Fire Creek(?)				1	0	262	4
Slate				2	0	264	4
Sandstone, Pineville				35	8	300	0

The records of borings Nos. 112, 113, 115, 116, 117, 118, 121, 122, 123, 124, 124A, 125, 126, 127, 129, 132, 133, 134, 135, 136, 138, and 140 are published with the permission of Mr. S. M. Wolffe, Superintendent of Lands, New River and Pocahontas Consolidated Coal Company.

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 19—No. 112 on Map II.

Fayette County, Sewell Mountain District; located on Glade Creek ¼ mile southeast of Sims School; elevation, 2641′ L.

				Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (282′+)							
Surface				4	6	4	6
Sandstone				0	8	5	2
Shale, dark				14	5	19	7
Shale, dark, sandy				1	5	21	0
Shale, dark				15	6	36	6
Sandstone				6	0	42	6
Shale, dark				6	6	49	0
Shale, light				5	0	54	0
Shale, light, sandy				3	1	57	1
Sandstone	24′	0″	Quinnimont				
Shale, dark, sandy	0	3		45	6	102	7
Sandstone	21	3					
Shale, dark				24	9	127	4
Bone and coal	0′	5″	Fire Creek (2512′)				
Coal	0	2½					
Bone	0	1½		1	6	128	10
Coal	0	9					
Shale, dark				7	9	136	7
Shale, dark, sandy				11	0	147	7
Bone and coal	0′	5″	Little Fire Creek				
Shale, dark	2	4					
Slate and coal	0	6		3	3	150	10
Shale, dark				1	1	151	11
Shale, dark, sandy				1	10	153	9
Shale, dark				6	3	160	0
Soapstone and light shale				2	0	162	0

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, sandy, light and dark	14	7	176	7
Sandstone, **Pineville**	10	5	187	0
Shale, dark	0	5	187	5
Sandstone	6	2	193	7
Shale, dark	0	2	193	9
Sandstone, **Flattop**	32	5	226	2
Shale, dark	0	7	226	9
Sandstone	8	4	235	1
Shale, dark	1	1	236	2
Sandstone, **Pierpont**	32	2	268	4
Shale, dark, sandy, **Royal**	7	10	276	2
Coal, dirty 1′ 11″				
Coal and slate 0 9				
Slate 0 6 — **No. 6 Pocahontas** (2361′)	3	7	279	9
Coal and slate 0 5				
Shale, dark, and soapstone	2	3	282	0

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 20—No. 113 on Map II.

Fayette County, Sewell Mountain District; on Glade Creek, 1.3 miles southwest of Sims School; elevation, 2595′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsvills Series (495′+)				
Surface	22	6	22	6
Shale, dark, sandy	13	2	35	8
Shale, dark	10	8	46	4
Sandstone	4	5	50	9
Shale, dark, sandy	1	6	52	3
Sandstone	16	8	68	11
Shale, dark	31	6	100	5
Sandstone	3	0	103	5
Shale, dark	0	4	103	9
Sandstone	2	1	105	10
Shale	2	8	108	6
Sandstone	0	10	109	4
Shale, dark	1	3	110	7
Sandstone, **Quinnimont**	14	0	124	7
Shale, dark	15	5	140	0
Bone	0	4	140	4
Coal, Fire Creek (2454′)	1	0	141	4
Slate, dark	0	6	141	10
Shale, dark	5	0	146	10
Shale, dark, sandy	1	5	148	3
Shale, dark	23	0	171	3
Shale, dark, sandy	10	11	182	2
Sandstone, **Pineville?**	8	0	190	2
Shale, dark	0	6	190	8
Slate and **coal**	0	4	191	0
Soapstone and dark shale	7	1	198	1
Bone and **coal, No. 8 Pocahontas**	0	2	198	3
Slate, dark	2	5	200	8
Soapstone and dark shale	10	0	210	8
Sandstone	1	8	212	4

		Thickness. Ft.	In.	Total. Ft.	In.
Shale, dark		5	4	217	8
Sandstone, **Flattop and Pierpont**		78	3	295	11
Shale, dark, and **coal, No. 6 Pocahontas?**		1	9	297	8
Shale, dark		7	1	304	9
Slate and **coal, No. 6 Pocahontas?**		1	2	305	11
Soapstone and light shale		4	7	310	6
Shale, dark		32	9	343	3
Sandstone		3	10	347	1
Shale, dark		0	11	348	0
Sandstone		3	3	351	3
Coal and slate .... 0′ 10″ Bone .... 0 2 **Coal** 2 9	**No. 4 Pocahontas** (2240′)	3	9	355	0
Soapstone and dark shale		6	4	361	4
Shale, dark		8	8	370	0
Sandstone		1	0	371	0
Shale, dark, sandy		0	9	371	9
Sandstone		4	1	375	10
Shale, dark, sandy		16	3	392	1
Shale, dark, and soapstone		11	0	403	1
Shale, dark		3	3	406	4
Bone and **coal** .... 0′ 9″ Shale, dark .... 3 0 Bone and **coal** 0 8	**No. 3 Pocahontas** (2184′)	4	5	410	9
Shale, dark		3	10	414	7
Shale, dark, sandy		4	5	419	0
Shale, dark		3	0	422	0
Shale, dark, sandy		2	0	424	0
Shale, dark		9	2	433	2
Slate and **coal**		1	0	434	2
Soapstone		0	7	434	9
Bone and **coal**		0	3	435	0
Slate, dark		0	3	435	3
Bone and **coal**		0	3	435	6
Shale, dark		2	0	437	6
Bone		0	1	437	7
Coal .... 2′ 0″ Bone .... 0 1 **Coal** 0 6	**No. 2 Pocahontas** (2155′)	2	7	440	2
Shale, dark, and soapstone		7	7	447	9
Shale, dark		2	8	450	5
Shale, light		8	10	459	3
Shale, sandy, light, and dark		11	8	470	11
Slate		0	2	471	1
Coal, No. 1 Pocahontas		0	7	471	8
Soapstone and light shale		2	4	474	0
Shale, sandy, dark		21	0	495	0

The partial record of boring **No. 114** may be found in the table of Summarized Records at the beginning of this chapter. The complete record was not secured.

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 22—No. 115 on Map II.

Fayette County, Sewell Mountain District; 1.95 miles east of Danese and 2 miles west of Bellwood; elevation, 2801′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (277′+)				
Surface	24	0	24	0
Sandstone	1	2	25	2
Shale, dark	1	3	26	5
Bone and **coal, Beckley**	1	0	27	5
Soapstone	1	0	28	5
Shale, light	1	11	30	4
Shale, dark	7	4	37	8
Bone	0	1	37	9
Shale, light	1	11	39	8
Sandstone	59	8	99	4
Sandstone and **coal** mixed	10	3	109	7
Shale, dark	13	8	123	3
Coal, Fire Creek (2678′)	0	3	123	6
Soapstone and light shale	6	11	130	5
Shale, dark, sandy	48	0	178	5
Shale, dark	0	7	179	0
Soapstone and light shale	3	2	182	2
Sandstone, **Pineville**	26	10	209	0
Shale, dark, sandy	1	0	210	0
Sandstone	1	1	211	1
Shale, dark	52	0	263	1
Bone	0	2	263	3
Coal 2′ 8″ } **No. 7 Poca-**				
Bone and **coal** 0 4 } **hontas?**	3	0	266	3
Soapstone	0	2	266	5
Shale, dark	0	6	266	11
Shale, dark, sandy	5	6	272	5
Coal 0′ 5″ } **No. 6 Poca-**				
Bone and **coal** 0 6 } **hontas?**	0	11	273	4
Soapstone	0	6	273	10
Shale, light	3	7	277	5

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 18—No. 116 on Map II.

Fayette County, Sewell Mountain District; on Glade Creek, 1.7 miles northeast of Danese; elevation, 2571′ L.

	Thickness. Ft.	In.	Total Ft.	In.
Pottsville Series (336′+)				
Surface	14	0	14	0
Sandstone, **Lower Raleigh**	18	0	32	0
Shale, dark, sandy	12	7	44	7
Coal, Beckley? (2526′)	0	3	44	10
Soapstone and shale	5	7	50	5
Shale, dark	1	0	51	5
Sandstone	0	7	52	0
Shale, dark, sandy	0	1	52	1
Sandstone	0	2	52	3

						Thickness.		Total.	
						Ft.	In.	Ft.	In.
Shale, dark						0	7	52	10
Shale, dark, sandy						34	0	86	10
Shale, dark						42	10	129	8
Sandstone, **Quinnimont**						35	0	164	8
Shale, dark						6	11	171	7
Coal	0′	11″							
Bone	0	1							
Soapstone and shale	1	1	**Fire Creek**			5	4	176	11
Bone and **coal**	1	7	(2394′)						
Coal	1	5							
Slate and **coal**	0	3							
Soapstone						1	3	178	2
Shale, dark						7	0	185	2
Shale, dark, sandy						16	10	202	0
Coal						0	2	202	2
Slate and **coal**						1	1	203	3
Soapstone						0	4	203	7
Shale, dark						32	7	236	2
Bone **coal** and slate	2′	2″	**No. 8 Poca-**						
Slate and **coal**	1	8	**hontas** (2331′)			3	10	240	0
Soapstone						2	1	242	1
Shale, dark						30	11	273	0
Shale, dark, and sandstone						0	9	273	9
Sandstone, **Flattop**						10	1	283	10
Sandstone and **coal**						0	1	283	11
Sandstone						5	4	289	3
Shale, dark						0	9	290	0
Sandstone, **Pierpont**						34	10	324	10
Bone and **coal, No. 6 Pocahontas** (2243′)						2	10	327	8
Soapstone and light shale						8	7	336	3

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 2—No. 117 on Map II.

Fayette County, Sewell Mountain District; located on the south branch of Pole Creek, 1.5 miles southeast of Danese; elevation, 2863′ L.

	Thickness.		Total.	
Pottsville Series (419′+)	Ft.	In.	Ft.	In.
Surface	17	0	17	0
Sandstone	19	0	36	0
Sandstone, red	0	10	36	10
Shale, dark	12	0	48	10
Shale, dark, sandy	9	5	58	3
Sandstone	28	0	86	3
Shale, dark	4	0	90	3
Slate, black	2	0	92	3
Shale, gray	10	0	102	3
Slate, gray	6	5	108	8
Coal, Little Raleigh	0	4	109	0
Shale, dark	20	0	129	0
Shale, sandy	3	0	132	0
Sandstone	35	6	167	6
Shale, sandy	4	6	172	0

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, dark	6	6	178	6
Slate, black, Beckley Coal horizon?	5	0	183	6
Shale, variegated	1	6	185	0
Shale, gray	3	0	188	0
Sandstone	15	0	203	0
Shale, dark	12	0	215	0
Shale, sandy	10	8	225	8
Slate, gray	15	4	241	0
Shale, sandy	6	0	247	0
Sandstone	28	0	275	0
Slate, gray	16	0	291	0
Shale, gray	9	0	300	0
Slate, gray	6	0	306	0
Shale, sandy	9	0	315	0
Slate, gray	53	0	368	0
Shale, sandy	2	0	370	0
Slate, black	0	6	370	6
Bone	0	6	371	0
Slate, black	2	0	373	0
Slate, gray	12	0	385	0
Shale, sandy	14	6	399	6
Shale, dark	4	6	404	0
Shale, sandy	7	0	411	0
Sandstone, conglomeratic	4	0	415	0
Shale, dark	1	2	416	2
Sandstone, conglomeratic	3	6	419	8

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 1—No. 118 on Map II.

Fayette County, Sewell Mountain District; located on Smoky Branch one-half mile east of Danese; elevation, 2621′ L.

Pottsville Series (513′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	12	0	12	0
Shale, dark	36	0	48	0
Slate, gray	4	0	52	0
Shale, gray	4	0	56	0
Sandstone	2	0	58	0
Shale, gray	3	8	61	8
Coal and bone	0	4	62	0
Shale, sandy	1	0	63	0
Sandstone	91	0	154	0
Coal, Beckley (2467′)	0	6	154	6
Shale, variegated	2	0	156	6
Sandstone	5	0	161	6
Shale, gray, sandy	10	0	171	6
Sandstone	2	0	173	6
Shale, gray, sandy	12	0	185	6
Sandstone	2	0	187	6
Shale, dark	23	0	210	6
Shale, sandy	7	0	217	6
Shale, gray	3	0	220	6
Slate, black	0	6	221	0

				Thickness. Ft.	In.	Total. Ft.	In.
Coal and bone, Fire Creek (2400')				0	6	221	6
Shale, gray				1	6	223	0
Sandstone				15	0	238	0
Slate, gray				55	0	293	0
Slate, black				12	9	305	9
Bone	0'	4"	No. 8? No. 9? Pocahontas (2311')				
Coal	2	3					
Slate	0	10		4	7	310	4
Coal	1	1					
Bone	0	1					
Slate, dark				10	0	320	4
Coal				0	5	320	9
Slate				0	6	321	3
Coal				1	3	322	6
Shale, gray				6	0	328	6
Bone				0	4	328	10
Shale, gray				12	0	340	10
Coal and bone				1	0	341	10
Shale, variegated				3	10	345	8
Sandstone				2	0	347	8
Shale, sandy				10	0	357	8
Sandstone, conglomeratic				28	0	385	8
Bone				0	1	385	9
Sandstone, conglomeratic				15	0	400	9
Shale				0	4	401	1
Coal	1'	7"	No. 6 Pocahontas (2218')				
Bone	0	3		1	10	402	11
Shale, gray				5	0	407	11
Shale and clay				3	6	411	5
Shale, gray				6	8	418	1
Slate, dark				32	0	450	1
Slate, gray				37	0	487	1
Sandstone, hard				26	0	513	1

The two following records were previously published on pages 447 and 448 of the Fayette County Report:

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 5—No. 119 on Map II.

Fayette County, Sewell Mountain District; on south bank of Glade Creek, 0.3 mile southeast of Pittman Schoolhouse and 1.0 mile north of Danese; authority, J. S. Cunningham; elevation, 2554' L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (291'+)				
Surface	9	6	9	6
Shale, gray, sandy	18	6	28	0
Sandstone	14	9	42	9
Shale, gray	3	4	46	1
Slate	1	0	47	1
Bone, Little Raleigh Coal	0	7	47	8
Shale, gray	14	0	61	8

				Thickness. Ft.	In.	Total. Ft.	In.
Sandstone	17′	5″	Lower Raleigh	64	6	126	2
Shale	0	9					
Sandstone, conglomerate	42	4					
Shale, soft, gray	4	0					
Sandstone				4	0	130	2
Shale, sandy				11	6	141	8
Shale, gray, with iron and sulphur				5	6	147	2
Slate				1	7	148	9
Coal, Beckley (2405′ L.)				1	1	149	10
Shale				0	6	150	4
Shale, variegated				2	0	152	4
Shale, sandy				3	0	155	4
Shale, dark				6	0	161	4
Shale, sandy				3	0	164	4
Slate, gray				14	5	178	9
Shale, gray, sandy				18	6	197	3
Shale, gray	25′	0″	Quinnimont	73	6	270	9
Slate	0	6					
Bone	0	8					
Slate, gray	47	4					
Slate				15	4	286	1
Coal, bone	0′	1″	Fire Creek	3	5	289	6
Coal	3	4					
Shale, gray, to bottom				2	0	291	6

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 21—No. 120 on Map II.

Fayette County, Sewell Mountain District, on south bank of Smoky Branch at mouth of Sandy Creek, 1.0 mile northwest of Danese; location on Map II in error—belongs 0.83 mile south; authority, J. S. Cunningham; elevation, 2560.42′ L.

				Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (215′±)							
Surface				7	0	7	0
Sandstone, Lower Raleigh				24	0	31	0
Shale, light and dark				4	6	35	6
Shale, dark, sandy				12	6	48	0
Shale, dark				5	10	53	10
Coal and bone, Beckley (2506′ L.)				0	7	54	5
Shale, light, and soapstone				2	7	57	0
Sandstone	24′	0″	Quinnimont	91	10	148	10
Shale, dark, sandy	11	8					
Sandstone	11	2					
Shale, dark, sandy	14	2					
Sandstone	30	10					
Shale, dark, Quinnimont				61	6	210	4
Coal and bone	0	1½″	Fire Creek (2346′ L.)	4	5½	214	9½
Coal	3	7½					
Bone	0	4½					
Coal	0	4					
Soapstone, to bottom				0	2½	215	0

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 17—No. 121 on Map II.

Fayette County, Sewell Mountain District; 0.35 mile east of Ebenezer School and 1.05 miles south of Danese; elevation, 2739′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (386′+)				
Surface	3	0	3	0
Sandstone, **Upper Raleigh**	66	6	69	6
Shale, dark	1	6	71	0
Sandstone	1	6	72	6
Shale, dark, sandy	1	7	74	1
Sandstone	2	5	76	6
Shale, dark, sandy	1	7	78	1
Sandstone	11	6	89	7
Shale, dark	0	11	90	6
Bone and **coal** 0′ 3″ / **Coal** 0 10 } **Little Raleigh "A"**	1	1	91	7
Soapstone and light shale	5	3	96	10
Shale, dark, sandy	5	4	102	2
Shale, dark	2	7	104	9
Shale and **coal**	0	4	105	1
Soapstone and light shale	1	2	106	3
Shale, dark	1	0	107	3
Bone	0	3	107	6
Coal, Little Raleigh	0	6	108	0
Soapstone	2	2	110	2
Sandstone, **Lower Raleigh**	61	0	171	2
Shale, dark, sandy	21	10	193	0
Shale, dark	1	0	194	0
Shale, dark, sandy	7	6	201	6
Shale, dark	17	7	219	1
Shale, dark, sandy	9	7	228	8
Shale, dark	4	0	232	8
Sandstone	7	2	239	10
Shale, dark	6	4	246	2
Sandstone	2	10	249	0
Shale, dark, sandy	7	7	256	7
Sandstone, **Quinnimont**	22	2	278	9
Shale, dark	32	0	310	9
Bone and **coal** 0′ 7″ / Shale, dark 3 9 / Bone and **coal** 0 9 } **Fire Creek Coal** (2422′)	5	1	315	10
Shale, dark	18	0	333	10
Shale, dark, sandy	9	6	343	4
Shale, dark	17	7	360	11
Coal 0′ 2″ / Bone and **coal** 1 0 / Shale, dark 1 5 / Bone and **coal** 0 5 } **No. 8 Pocahontas Coal** (2374′)	3	0	363	11
Shale, dark and light	14	8	378	7
Sandstone, **Flattop**	7	5	386	0

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 15—No. 122 on Map II.

Fayette County, Quinnimont District; 1.6 miles north-northwest from Red Spring; elevation, 2781' L.

Pottsville Series (343'+)				Thickness. Ft.	In.	Total. Ft.	In.
Surface				5	10	5	10
Sandstone				44	0	49	10
Shale, dark				2	4	52	2
Coal and dirt				1	0	53	2
Fire clay				2	0	55	2
Shale, dark				1	3	56	5
Bone and coal				0	2	56	7
Slate				0	2	56	9
Shale, light and dark				5	0	61	9
Shale, dark, sandy				12	2	73	11
Shale, dark				3	3	77	2
Coal and bone, Little Raleigh?				1	1	78	3
Slate, dark				14	0	92	3
Bone and coal				0	5	92	8
Shale, dark				0	3	92	11
Sandstone				37	6	130	5
Shale, dark, sandy				2	6	132	11
Sandstone				8	9	141	8
Shale, dark, sandy				1	3	142	11
Sandstone				1	6	144	5
Shale, dark, sandy				5	0	149	5
Sandstone				0	3	149	8
Shale, dark, sandy				18	10	168	6
Shale, dark				4	0	172	6
Soapstone and shale, light				5	6	178	0
Sandstone				32	10	210	10
Shale, dark, sandy				0	6	211	4
Sandstone				37	0	248	4
Shale, light and dark				6	2	254	6
Shale, dark, sandy				11	6	266	0
Sandstone				4	6	270	6
Shale, dark				51	2	321	8
Coal	0'	5"					
Slate, dark	0	10					
Coal	1	11					
Bone	0	3	No. 8 Poca-				
Coal	0	2	hontas? (2455')	4	6	326	2
Slate and coal	0	6					
Coal	0	4					
Slate and coal	0	1					
Soapstone and dark shale				15	4	341	6
Coal	0'	8"					
Bone	0	1	No. 8 Poca-				
Coal	0	5	hontas? (2438')	1	3	342	9
Bone	0	1					
Soapstone				0	6	343	3

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 14—No. 123 on Map II.

Fayette County, Quinnimont District; on Pond Branch, 1.1 miles northwest of Red Spring; elevation, 2584' L.

	Thickness.		Total.	
Pottsville Series (219'+)	Ft.	In.	Ft.	In.
Surface	10	0	10	0
Sandstone	0	9	10	9
Shale, dark	12	6	23	3
Bone and coal, Fire Creek? (2550')	0	4	23	7
Fire clay	0	1	23	8
Soapstone and shale, light and dark	3	2	26	10
Shale, dark	5	8	32	6
Shale, dark, sandy	24	0	56	6
Shale, dark	4	5	60	11
Coal ..... 2' 8" } No. 8 Poca- Slate and coal ..... 1 0 } hontas (2519')	3	8	64	7
Soapstone and shale	5	3	69	10
Shale, dark	42	1	111	11
Sandstone	35	0	146	11
Shale, dark	0	10	147	9
Sandstone	10	7	158	4
Shale, dark	0	2	158	6
Coal ..... 0' 7" } No. 6 Poca- Bone and coal ..... 0 1 } hontas (2425')	0	8	159	2
Shale, dark, sandy	12	10	172	0
Sandstone	2	7	174	7
Shale, dark	0	8	175	3
Shale, dark, and coal	0	4	175	7
Shale, dark	14	0	189	7
Shale, dark, sandy	16	2	205	9
Sandstone	13	3	219	0

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 10—No. 124 on Map II.

Fayette County, Quinnimont District; at mouth of Red Spring Creek, 0.95 mile north of Red Spring; elevation, 2564' L.

	Thickness.		Total.	
Pottsville Series (150'+)	Ft.	In.	Ft.	In.
Surface	10	0	10	0
Shale, dark	14	3	24	3
Shale, dark, sandy	10	9	35	0
Sandstone	2	7	37	7
Shale, dark	1	4	38	11
Sandstone	3	4	42	3
Shale, dark	3	0	45	3
Sandstone	4	1	49	4
Shale, light	12	7	61	11
Sandstone	0	11	62	10
Coal, No. 8 Pocahontas? (2500')	0	8	63	6
Sandstone, Flattop	41	0	104	6
Sandstone and coal	1	6	106	0
Sandstone	4	2	110	2
Shale	0	7	110	9

	Thickness. Ft.	In.	Total. Ft.	In.
Bone and coal .... 0′ 9″ / Slate .... 0 4 / Coal .... 0 9 — No. 7 Pocahontas (2451′)	1	10	112	7
Soapstone and shale, light	9	0	121	7
Shale, sandy, light and dark	5	0	126	7
Sandstone, **Pierpont**	18	0	144	7
Bone	0	2	144	9
Bone and **coal** .... 0′ 6″ / Slate and **coal** .... 1 8 — No. 6 Pocahontas (2417′)	2	2	146	11
Shale, light	3	1	150	0

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 11—No. 124A on Map II.

Fayette County, Quinnimont District; 0.85 mile west of Crickmer; elevation, 2722′ L.

Pottsville Series (328′+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	28	0	28	0
Shale, dark	11	0	39	0
Sandstone, **Lower Raleigh**	58	6	97	6
Shale, dark, sandy	9	6	107	0
Soapstone and fire clay	4	0	111	0
Sandstone	2	0	113	0
Shale, dark, sandy	15	0	128	0
Shale, dark	29	0	157	0
Shale, dark, sandy	22	3	179	3
Shale, dark	5	10	185	1
Coal, Fire Creek? (2536′)	0	8	185	9
Shale, dark	20	4	206	1
Coal	0	8	206	9
Shale, dark, sandy	11	8	218	5
Slate	1	0	219	5
Bone and **coal**	0	8	220	1
Shale, dark	4	8	224	9
Shale, dark, sandy	4	8	229	5
Shale, light, sandy	4	0	233	5
Shale, dark, sandy	2	4	235	9
Sandstone	0	6	236	3
Shale, dark, sandy	4	10	241	1
Sandstone	0	6	241	7
Shale, dark	0	3	241	10
Sandstone	1	4	243	2
Shale, dark	0	6	243	8
Sandstone, **Flattop**	46	6	290	2
Shale, dark	6	3	296	5
Coal, No. 6 Pocahontas? (2424′)	1	7	298	0
Soapstone and shale	4	8	302	8
Bone and **coal**	0	9	303	5
Shale, very dark	1	0	304	5
Shale, dark	10	8	315	1
Shale, dark, sandy	2	2	317	3
Shale, light, sandy	7	0	324	3
Sandstone	3	9	328	0

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 4—No. 125 on Map II.

Fayette County, Quinnimont District; near Crickmer; elevation, 2865′ L.

	Thickness.		Total.	
Pottsville Series (459′+)	Ft.	In.	Ft.	In.
Surface	6	6	6	6
Sandstone, conglomerate	62	0	68	6
Shale, gray	36	6	105	0
Sandstone	47	0	152	0
Shale, gray	22	0	174	0
Sandstone	56	0	230	0
Slate, gray	13	0	243	0
Sandstone	26	0	269	0
Slate, dark	58	0	327	0
Bone	0	4	327	4
Slate, gray	30	8	358	0
Shale, gray	11	0	369	0
Slate, gray	24	0	393	0
Sandstone	34	10	427	10
Slate, dark	7	6	435	4
Bone and coal 0′ 2″ **Coal** 1 1 Bone and coal 0 4 } No. 6 Pocahontas (2428′)	1	7	436	11
Shale, light, sandy	5	0	441	11
Sandstone	17	4	459	3

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 3—No. 126 on Map II.

Fayette County, Quinnimont District; headwaters of Laurel Creek, one mile northeast from Crickmer; elevation, 2904′ L.

	Thickness.		Total.	
Pottsville Series (532′+)	Ft.	In.	Ft.	In.
Surface	10	6	10	6
Shale, gray	25	6	36	0
Slate, black	2	0	38	0
Coal, Little Raleigh	0	4	38	4
Shale, gray	6	6	44	10
Shale, sandy	2	4	47	2
Sandstone	2	6	49	8
Shale, gray	8	6	58	2
Sandstone	25	0	83	2
Shale, sandy	17	0	100	2
Shale, gray	14	0	114	2
Shale, sandy	19	0	133	2
Slate, black	4	0	137	2
Sandstone	41	0	178	2
Shale, dark	16	0	194	2
Shale, gray	54	6	248	8
Slate, dark	18	0	266	8
Shale, gray	5	0	271	8
Shale, variegated	1	6	273	2
Sandstone	6	6	279	8

	Thickness.		Tot	
	Ft.	In.	Ft.	In.
Shale, dark	1	6	281	2
Sandstone	0	8	281	10
Shale, gray	4	0	285	10
Sandstone	1	0	286	10
Slate, gray	3	6	290	4
Coal, Fire Creek? (2613′)	0	4	290	8
Slate, gray	22	0	312	8
Shale, sandy	8	0	320	8
Shale, dark	5	0	325	8
Slate, dark	1	0	326	8
Bone	1	0	327	8
Slate, black	2	6	330	2
Coal	0	6	330	8
Slate	1	0	331	8
Shale, sandy	8	0	339	8
Slate, black	4	0	343	8
Bone and **coal**	0	9	344	5
Shale	1	3	345	8
Sandstone	2	0	347	8
Shale, sandy	1	0	348	8
Sandstone, conglomerate	74	6	423	2
Bone	0	4	423	6
Coal, No. 6 Pocahontas (2479′)	1	9	425	3
Shale	0	4	425	7
Shale, variegated	2	4	427	11
Shale, gray	4	0	431	11
Shale, sandy, dark	29	9	461	8
Shale, gray	16	6	478	2
Slate, gray	41	10	520	0
Bone	0	2	520	2
Coal, No. 3 Pocahontas (2383′)	1	1	521	3
Shale, sandy, variegated	5	3	526	6
Sandstone, conglomerate	6	4	532	10

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 23—No. 127 on Map II.

Fayette County, Quinnimont District; 1.65 miles west of Quinton School and 1.2 miles northeast of Rock of Ages School; elevation, 2978′ L.

	Thickness.		Total.	
Pottsville Series (511′+)	Ft.	In.	Ft.	In.
Surface	27	8	27	8
Sandstone	40	4	68	0
Shale, dark	3	3	71	3
Sandstone	4	10	76	1
Shale, dark, sandy	11	4	87	5
Shale, dark	3	3	90	8
Sandstone	64	0	154	8
Shale, dark	3	0	157	8
Shale, light and dark	15	8	173	4
Sandstone	11	0	184	4
Shale, dark	34	6	218	10
Coal, Fire Creek? (2759′)	0	7	219	5
Soapstone	0	8	220	1

	Thickness.		Total.	
	Ft.	In.	Ft.	In.
Shale, dark	23	4	243	5
Shale, dark, sandy	22	11	266	4
Coal	0	5	266	9
Bone	0	1	266	10
Coal (2710′)	0	7	267	5
Shale, dark	15	11	283	4
Coal	0	1	283	5
Soapstone and dark shale	2	11	286	4
Coal, No. 8 Pocahontas?	0	9	287	1
Soapstone	0	8	287	9
Shale, dark	11	6	299	3
Bone and coal	0	10	300	1
Shale, dark	3	4	303	5
Bone and coal	0	4	303	9
Coal, No. 7 Pocahontas?	0	5	304	2
Shale and coal	1	2	305	4
Bone and coal	0	7	305	11
Shale	0	9	306	8
Shale and coal	1	1	307	9
Shale, dark	7	10	315	7
Shale, dark, sandy	4	4	319	11
Sandstone	1	1	321	0
Shale	0	3	321	3
Sandstone	3	9	325	0
Sandstone and coal	0	11	325	11
Sandstone	5	1	331	0
Shale, light	1	4	332	4
Shale, dark	2	9	335	1
Sandstone	45	0	380	1
Sandstone and coal	2	3	382	4
Bone	0	1	382	5
Coal and dirt, No. 6 Pocahontas? (2595′)	0	8	383	1
Soapstone and dark shale	13	0	396	1
Shale, dark	4	7	400	8
Sandstone	7	5	408	1
Shale, dark	1	3	409	4
Coal, No. 6 Pocahontas? (2569′)	0	6	409	10
Soapstone and dark shale	4	6	414	4
Sandstone	0	4	414	8
Shale, dark	2	0	416	8
Shale, dark, sandy	9	1	425	9
Sandstone	2	0	427	9
Shale, dark	0	2	427	11
Sandstone	1	4	429	3
Shale, dark, sandy	16	0	445	3
Shale, dark	14	5	459	8
Coal	0	3	459	11
Soapstone	3	2	463	1
Shale, dark	3	11	467	0
Sandstone	7	9	474	9
Coal and dirt, No. 3 Pocahontas? (2503′)	0	6	475	3
Soapstone and dark shale	5	5	480	8
Sandstone	13	8	494	4
Shale, dark, sandy	3	0	497	4
Shale, dark	11	4	508	8

	Thickness. Ft.	In.	Total. Ft.	In.
Bone and coal, No. 3 Pocahontas? (2469')	0	2	508	10
Sandstone	2	2	511	0

The partial record of boring **No. 128** may be found in the table of Summarized Records at the beginning of this chapter. The complete record was not secured.

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 12—No. 129 on Map II.

Fayette County, Quinnimont District; just east of Rock of Ages School on Laurel Creek; elevation, 2872' L.

Pottsville Series (439'+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	16	0	16	0
Shale, dark	6	0	22	0
Shale, dark, sandy	0	3	22	3
Sandstone	0	1	22	4
Shale, dark	0	5	22	9
Sandstone	0	2	22	11
Shale, dark, sandy	1	5	24	4
Sandstone	3	4	27	8
Shale, dark, sandy	36	4	64	0
Shale, dark	16	4	80	4
Shale, dark, sandy	1	4	81	8
Shale, dark	1	0	82	8
Shale, dark, sandy	0	3	82	11
Shale, dark	0	2	83	1
Bone and coal	0	2	83	3
Shale, light, sandy	6	6	89	9
Shale, dark, sandy	4	6	94	3
Sandstone	6	6	100	9
Shale, light, sandy	1	0	101	9
Sandstone	1	4	103	1
Shale, sandy, light and dark	10	0	113	1
Shale, dark	16	6	129	7
Bone and coal, Beckley? (2742')	0	1	129	8
Shale, dark	32	0	161	8
Bone	0	1	161	9
Shale, dark	0	3	162	0
Bone	0	2	162	2
Soapstone and shale, light	3	10	166	0
Shale, sandy, light and dark	36	8	202	8
Sandstone	1	0	203	8
Shale, dark	50	3	253	11
No. 8 Pocahontas (2616'): Shale, dark, with coal streaks 1' 0"; Soapstone and shale, dark 0' 8"; Shale, dark, with coal streak 0' 6"	2	2	256	1
Soapstone and shale, light	8	2	264	3

	Thickness. Ft.	In.	Total. Ft.	In.
Sandstone .... 25′ 11″; Sandstone, with coal seams .... 4′ 2″; Sandstone .... 14′ 1″ — Flattop	44	2	308	5
Bone and coal, No. 7 Pocahontas (2563′)........	0	5	308	10
Soapstone	0	3	309	1
Sandstone	0	5	309	6
Shale, dark and light........	2	1	311	7
Sandstone	8	0	319	7
Shale, light	1	1	320	8
Sandstone	5	7	326	3
Shale, sandy, light and dark	23	2	349	5
Bone and coal........	0	3	349	8
Sandstone and coal, mixed........	0	4	350	0
Soapstone	0	4	350	4
Shale, light	0	6	350	10
Shale, sandy, light and dark	10	9	361	7
Slate, dark	0	4	361	11
Bone and coal	0	3	362	2
Shale, dark	13	3	375	5
Bone and coal, No. 6 Pocahontas? (2496′)........	0	10	376	3
Shale, light and dark	5	1	381	4
Shale, dark	2	1	383	5
Bone and coal	0	4	383	9
Soapstone and light shale	7	0	390	9
Shale, dark	1	3	392	0
Bone and coal, No. 6 Pocahontas? (2474′)........	5	9	397	9
Soapstone and light shale	11	6	409	3
Shale, dark	4	6	413	9
Bone and coal........	0	3	414	0
Shale, dark, and coal	0	5	414	5
Shale, dark, sandy	11	6	425	11
Bone and coal	0	6	426	5
Shale, dark	0	6	426	11
Soapstone and dark shale........	4	1	431	0
Sandstone	8	0	439	0

The partial records of borings **Nos. 130 and 131** may be found in the table of Summarized Records at the beginning of this chapter. The complete records were not secured.

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 8—No. 132 on Map II.

Fayette County, Quinnimont District; on Bear Branch of Laurel Creek, 0.9 mile west of Walnut Flat School; elevation, 2741′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (233′+)				
Surface	7	6	7	6
Shale, light	1	0	8	6
Shale, dark	11	6	20	0
Shale, light, sandy	9	0	29	0
Shale, dark	15	7	44	7
Coal, Fire Creek? (2697′)........	0	2	44	9

				Thickness. Ft.	In.	Total. Ft.	In.
Fire clay				1	3	46	0
Shale, light				3	0	49	0
Shale, light, sandy				2	4	51	4
Shale, dark				24	0	75	4
Sandstone				0	4	75	8
Shale, dark				0	1	75	9
Sandstone	18′	6″					
Shale, dark	0	6	Pineville	38	4	114	1
Sandstone	19	4					
Sandstone and coal streaks				1	5	115	6
Coal, No. 9 Pocahontas				0	4	115	10
Sandstone				1	0	116	10
Coal and slate				0	4	117	2
Sandstone				0	7	117	9
Coal, No. 8 Pocahontas? (2623′)				0	5	118	2
Sandstone				18	8	136	10
Shale, dark, sandy				0	8	137	6
Sandstone and coal				1	3	138	9
Sandstone				4	10	143	7
Coal				0	3	143	10
Soapstone				1	8	145	6
Shale, light				7	1	152	7
Sandstone				30	2	182	9
Coal				0	3	183	0
Soapstone				1	3	184	3
Shale, dark				3	1	187	4
Shale, light				2	0	189	4
Sandstone				12	4	201	8
Shale, dark, sandy				6	10	208	6
Shale, dark				2	5	210	11
Coal	0′	4″					
Bone	0	1					
Coal	3	4	No. 6 Pocahontas (2525′)	4	9	215	8
Bone	0	4½					
Coal	0	7½					
Shale, dark				0	6	216	2
Sandstone				13	4	229	6
Shale, dark				0	6	230	0
Coal and bone				0	1	230	1
Shale, dark				0	2	230	3
Coal and bone				0	7	230	10
Soapstone				1	11	232	9

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 9—No. 133 on Map II.

Fayette County, Quinnimont District; on Bear Branch of Laurel Creek, 1 mile northeast of Red Spring; elevation, 2719′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (335′+)				
Surface	15	0	15	0
Shale, dark, sandy	24	9	39	9
Sandstone	8	6	48	3
Shale, dark	6	10	55	1
Coal and bone, Fire Creek? (2663′)	0	8	55	9

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, dark	4	6	60	3
Shale, dark, sandy	11	0	71	3
Shale, dark	9	0	80	3
Coal and bone, Little Fire Creek? (2638')	0	2	80	5
Shale, dark and light	17	10	98	3
Shale, dark, sandy	20	6	118	9
Coal and bone, No. 8 Pocahontas (2600')	1	0	119	9
Clay and soapstone	0	5	120	2
Shale, dark	2	3	122	5
Shale, dark, sandy	5	5	127	10
Sandstone, Flattop and Pierpont	72	0	199	10
Coal, No. 6 Pocahontas (2518')	1	4	201	2
Soapstone and shale, dark	9	3	210	5
Sandstone, Eckman	35	7	246	0
Sandstone and shale, mixed	0	10	246	10
Sandstone	0	6	247	4
Shale, dark	0	1	247	5
Coal, No. 5 Pocahontas? (2471')	0	10	248	3
Shale, dark	7	9	256	0
Sandstone	5	5	261	5
Shale, dark	0	11	262	4
Sandstone	0	4	262	8
Shale, dark, sandy	1	4	264	0
Shale, dark	41	1	305	1
Bone coal, No. 3 Pocahontas	0	2	305	3
Shale, dark	4	0	309	3
Shale, light	1	2	310	5
Shale, dark	3	6	313	11
Shale, dark, sandy	2	8	316	7
Sandstone	1	8	318	3
Shale, dark	0	8	318	11
Sandstone	13	9	332	8
Coal and sandstone	0	2	332	10
Sandstone	2	2	335	0

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 13—No. 134 on Map II.

Fayette County, Quinnimont District; on Red Spring Creek, 0.2 mile east from Red Spring; elevation, 2844' L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (421'+)				
Surface	18	2	18	2
Sandstone	33	8	51	10
Shale, dark, sandy	3	9	55	7
Sandstone	1	0	56	7
Shale, dark, sandy	18	0	74	7
Shale, light	5	5	80	0
Shale, dark, sandy	4	2	84	2
Shale, dark	34	0	118	2
Bone and coal	0	2	118	4
Soapstone and light shale	2	5	120	9
Shale, dark, sandy	22	4	143	1

	Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Shale, dark	6	6	149	7
Sandstone	0	3	149	10
Shale, dark, sandy	4	2	154	0
Bone and coal	0	5	154	5
Soapstone	1	0	155	5
Shale, dark	12	10	168	3
Sandstone	0	2	168	5
Shale, dark	0	10	169	3
Sandstone	0	4	169	7
Shale, dark	0	4	169	11
Bone and coal	0	2	170	1
Soapstone and light shale	4	0	174	1
Shale, dark	16	7	190	8
Coal 1' 1" Bone 0 1 Shale 0 8 Bone and coal 0 2 — No. 8 Pocahontas (2651')	2	0	192	8
Shale, dark	2	9	195	5
Shale, dark, sandy	0	9	196	2
Shale, dark	3	6	199	8
Shale, dark, sandy	7	7	207	3
Shale, dark	9	7	216	10
Shale, dark, sandy	0	6	217	4
Shale, dark	1	10	219	2
Sandstone	0	5	219	7
Shale, dark	8	2	227	9
Shale, dark, sandy	2	7	230	4
Sandstone	35	9	266	1
Shale, dark, sandy	0	3	266	4
Shale, dark and coal 0' 1" Sandstone and coal 1 7 — No. 7 Pocahontas	1	8	268	0
Sandstone	33	4	301	4
Shale, dark	0	4	301	8
Sandstone	5	4	307	0
Sandstone and coal 6' 1" Bone and coal 0 9 — No. 6 Pocahontas (2530')	6	10	313	10
Shale, dark	6	2	320	0
Shale, dark, sandy	6	1	326	1
Shale, dark	1	1	327	2
Bone and coal	0	3	327	5
Shale, dark	0	6	327	11
Soapstone	0	7	328	6
Shale, dark	6	0	334	6
Shale, dark, sandy	7	2	341	8
Sandstone	12	4	354	0
Shale, dark	3	2	357	2
Shale, dark, sandy	1	1	358	3
Sandstone	3	9	362	0
Shale, dark, sandy	3	0	365	0
Sandstone	16	10	381	10
Sandstone and coal	0	1	381	11
Sandstone	16	2	398	1
Shale, dark	12	0	410	1
Bone and coal, No. 3 Pocahontas (2434')	0	4	410	5
Shale, light	3	2	413	7
Shale, dark, sandy	7	7	421	2

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 7—No. 135 on Map II.

Fayette County, Quinnimont District; on Beelick Branch, 1.5 miles east-northeast from Red Spring; elevation, 2774′ L.

	Thickness.		Total.	
Pottsville Series (332′+)	Ft.	In.	Ft.	In.
Surface	7	0	7	0
Sandstone	2	6	9	6
Shale	2	6	12	0
Fire clay	3	6	15	6
Sandstone	3	6	19	0
Shale, dark, sandy	3	6	22	6
Sandstone	25	0	47	6
Shale, dark	0	5	47	11
Coal and bone	0	5	48	4
Fire clay	3	0	51	4
Sandstone	59	10	111	2
Shale	0	5	111	7
Coal ..... 1′ 8″ } No. 7 Pocahontas (2660′) Coal and slate 0 4	2	0	113	7
Shale	7	0	120	7
Shale, sandy	18	4	138	11
Shale	3	2	142	1
Shale, sandy	2	10	144	11
Sandstone	7	2	152	1
Shale, dark, sandy	20	0	172	1
Limestone (?)	7	0	179	1
Shale	2	6	181	7
Shale, dark, sandy	6	1	187	8
Sandstone	21	1	208	9
Shale	7	5	216	2
Coal and bone No. 4 Pocahontas? (2557′)	0	10	217	0
Shale	9	7	226	7
Sandstone	0	10	227	5
Shale, dark, sandy	14	6	241	11
Shale	18	7	260	6
Sandstone	19	4	279	10
Shale, sandy	3	0	282	10
Coal and bone	0	7	283	5
Shale, dark	22	4	305	9
Shale, light and dark	4	0	309	9
Shale, dark, sandy	6	0	315	9
Shale, dark	12	0	327	9
Coal and bone	0	6	328	3
Shale, light	4	3	332	6

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 16—No. 136 on Map II.

Fayette County, Quinnimont District; 0.6 mile south of Walnut Flat School; elevation, 2844.62′ L.

	Thickness.		Total.	
Pottsville Series 142′+)	Ft.	In.	Ft.	In.
Surface	7	4	7	4

	Thickness. Ft.	In.	Total. Ft.	In.
Sandstone	9	2	16	6
Shale, dark	0	5	16	11
Sandstone	9	7	26	6
Shale, dark	1	4	27	10
Sandstone, Flattop?	28	0	55	10
Coal, No. 7 Pocahontas? (2788')	0	10	56	8
Soapstone and light shale	13	0	69	8
Sandstone, Pierpont	62	4	132	0
Shale, dark	0	2	132	2
Coal 2' 8" Bone 0 9 Coal 1 3 — No. 6 Pocahontas (2708')	4	8	136	10
Soapstone and shale	4	10	141	8

The partial record of boring **No. 137** may be found in the table of Summarized Records at the beginning of this chapter. The complete record was not secured.

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 6—No. 138 on Map II.

Fayette County, Quinnimont District; on Beelick Branch, 1.5 miles east from Red Spring; elevation, 2741' L.

Pottsville Series (232'+)	Thickness. Ft.	In.	Total. Ft.	In.
Surface	7	0	7	0
Sandstone	49	0	56	0
Shale, gray, sandy	10	0	66	0
Sandstone, conglomerate	52	0	118	0
Bony, No. 6 Pocahontas Coal (2622')	1	2	119	2
Shale, soft, gray	4	0	123	2
Sandstone	42	0	165	2
Shale, gray	5	0	170	2
Coal and bone	0	6	170	8
Slate, gray	30	0	200	8
Slate, dark	5	0	205	8
Slate, gray	2	0	207	8
Coal and bone	0	7	208	3
Shale, gray	5	0	213	3
Shale, sandy	10	0	223	3
Slate, gray	2	0	225	3
Coal 0' 6" Bone 0 4 Coal 1 10 — No. 3 Pocahontas (2513')	2	8	227	11
Shale, gray	4	1	232	0

The partial record of boring **No. 139** may be found in the table of Summarized Records at the beginning of this chapter. The complete record was not secured.

New River & Pocahontas Consolidated Coal Company Coal Test Boring No. 24—No. 140 on Map II.

Fayette County, Quinnimont District; 1.05 miles east of Red Spring and 0.25 mile northwest of Eburnean School; elevation, 2746' L.

			Thickness.		Total.	
Pottsville Series (205'+)			Ft.	In.	Ft.	In.
Surface			4	0	4	0
Shale, dark			28	9	32	9
Bone and coal			0	6	33	3
Soapstone			1	4	34	7
Shale, dark, sandy			10	4	44	11
Coal and dirt, No. 7 Pocahontas (2701')			0	3	45	2
Shale, dark, sandy			2	8	47	10
Sandstone, Pierpont			62	4	110	2
Coal	0'	6½"				
Coal and slate	0	5½				
Coal	0	3	No. 6 Pocahontas (2634')	1	8	111	10
Bone	0	1½				
Coal	0	3½				
Soapstone			3	3	115	1
Shale, light			5	6	120	7
Sandstone, Eckman			49	5	170	0
Shale, dark			31	2	201	2
Coal	0'	8"				
Bone	0	1	No. 3 Pocahontas (2543')	1	5	202	7
Coal	0	8				
Soapstone			2	5	205	0

The record of boring **No. 141** of the Bellwood Coal Company was not secured.

The records of borings Nos. 142-152 inclusive, drilled on the property of the Bellwood Coal Company, were furnished the Survey by Mr. M. F. Peltier, Vice-President of the Peabody Coal Company, Chicago, Illinois.

Bellwood Coal Company Coal Test Boring No. 4—No. 142 on Map II.

Fayette County, Quinnimont District; 1.6 miles southwest of Bellwood and 0.35 mile northwest of Quinton School; drilled in April, 1928; elevation, 3285' L.

			Thickness.	Total.
Pottsville Series—New River Group (445'+)			Feet.	Feet.
Surface			4.00	4.00
Sandstone, coarse, brown	2.00'			
Sandstone, hard, gray, light	7.10	Lower Guyandot	34.10	38.10
Sandstone, dark, soft, crumbly	23.33			
Sandstone, hard, light-gray	1.67			

			Thickness. Feet.	Total. Feet.
Shale, dark, gray, sandy			18.25	56.35
Coal, Sewell (3228')			0.25	56.60
Shale, fire clay			0.25	56.85
Shale, fire clay, light, sandy			1.33	58.18
Sandstone, light, fine, **Welch**			19.83	78.01
Shale, light, sandy			10.58	88.59
Coal, Welch			0.17	88.76
Bone and slate			0.50	89.26
Shale, dark, sandy			11.33	100.59
Fire clay, light, and shale			1.67	102.26
Sandstone, light, fine, **Upper Raleigh**			43.33	145.59
Shale, dark, crumbly, fire clay			2.20	147.79
Shale, dark, sandy, fire clay			15.33	163.12
Sandstone, light, **coal** spars			1.75	164.87
Shale, blue, gray			38.39	203.26
Slate, dark-blue			1.71	204.97
Shale, dark-blue			6.83	211.80
Shale, dark, black, sandy			2.00	213.80
Sandstone, very hard, quartzy, light	4.25'			
Sandstone, very hard, dark, shaly	3.50	**Lower Raleigh**	38.29	252.09
Sandstone, very hard, gray, quartzy	16.54			
Sandstone, light-gray, coarse	14.00			
Shale, light-gray, sandy			66.12	318.21
Shale, dark, sandy			7.96	326.17
Coal, bony, Beckley?			0.50	326.67
Fire clay, shaly			0.12	326.79
Shale, light, sandy			66.79	393.58
Fire clay shale, **Fire Creek Coal horizon?**			0.29	393.37
Sandstone, light, coarse	23.94'			
Shale, dark, sandy	0.70			
Sandstone, light, coarse	17.45	**Pineville**	46.31	440.18
Sandstone, light-gray, (**coal** spars)	4.22			
Shale, dark, sandy			3.17	443.35
Coal	1.08'			
Bone	0.07			
Coal	0.25			
Sulphur	0.02			
Coal	0.19	**No. 8 Pocahontas**	2.27	445.62
"Mother **coal**"	0.10			
Coal	0.44			
Shaly bone	0.08			
Coal	0.04			
Shale, sandy			0.12	445.74
Slate, dark			0.04	445.78
Pottsville Series—Pocahontas Group (138'+)				
Shale, sandy	17.66'	**Flattop**	28.95	474.73
Sandstone, light, coarse	11.29			
Coal			0.25	474.98
Bone and shale			0.62	475.60
Slate shale			0.52	476.12
Coal			0.08	476.20

	Thickness. Feet.	Total. Feet.
Sulphur	0.01	476.21
Coal	0.58	476.79
Shale, sandy	16.72	493.51
Sandstone, light-gray, Pierpont	50.50	544.01
Shale, dark, sandy	16.55	560.56
Shale, dark, sandy, fire clay	0.19	560.75
Coal, No. 6 Pocahontas (2720′)	3.94	564.69
Shale, sandy, fire clay	1.50	566.19
Sandstone, light, coarse	9.50	575.69
Shale, light, sandy	5.02	580.71
Coal, with ½ bone in center	0.58	581.29
Shale, dark, sandy, fire clay	2.33	583.62

Bellwood Coal Company Coal Test Boring No. 6—No. 143 on Map II.

Fayette County, Quinnimont District; 1.95 miles south of Bellwood and 0.55 mile southeast of Quinton School; started, April 26, 1935; completed, May 15, 1935; elevation, 3006.32′ L.

	Thickness.		Total.	
Pottsville Series (200′+)	Ft.	In.	Ft.	In.
Sand boulders and yellow clay	9	0	9	0
Boulders and sandy clay	12	0	21	0
Sand boulders and yellow clay	15	0	36	0
Coal, No. 6 Pocahontas? (2970′)	0	6	36	6
Shale, gray, sandy	5	6	42	0
Coal, bone, and slate, No. 6 Pocahontas?	4	0	46	0
Shale, gray, sandy	7	0	53	0
Coal and fire clay	3	0	56	0
Shale, dark, sandy	9	4	65	4
Shale, dark	4	8	70	0
Coal	1	0	71	0
Shale, dark	3	0	74	0
Sandstone, hard	1	0	75	0
Shale, dark	0	8	75	8
Shale, sandy, hard	6	4	82	0
Shale, dark	14	6	96	6
Shale, black	4	6	101	0
Shale, sandy	6	0	107	0
Sandstone, hard	13	0	120	0
Sandstone, Upper Pocahontas	20	6	140	6
Shale, dark	3	6	144	0
Sandstone, hard	2	9	146	9
Coal, No. 3 Pocahontas	1	6	148	3
Shale and fire clay	1	8	149	11
Coal and bone	0	9	150	8
Shale, dark	8	4	159	0
Shale, light, sandy	4	6	163	6
Shale, dark, sandy	5	6	169	0
Sandstone, hard, Lower Pocahontas	26	7	195	7
Slate, black	0	5	196	0
Coal, No. 2 Pocahontas	0	9	196	9
Shale, blue, sandy	3	3	200	0

Bellwood Coal Company Coal Test Boring No. 1—No. 144 on Map II.

Fayette County, Quinnimont District; 2 miles south of Bellwood and 2.1 miles northwest of Springdale; drilled in February, 1928; elevation, 3155.35' L.

				Thickness.		Total	
				Ft.	In.	Ft	In
Pottsville Series—New River Group (64' ±)							
Clay				8	0	8	0
Sandstone, hard, light-gray, **Pineville**				35	0	43	0
Shale, dark-gray, sandy				3	0	46	0
Sandstone, dark-gray				18	0	64	0
Coal, very soft, No. 8 Pocahontas				0	1½	64	1½
Pottsville Series—Pocahontas Group (364')							
Sandstone, dark, hard				0	3½	64	5
Shale, dark, sandy				4	5¼	68	10¼
Sandstone, dark-gray, coarse, **Flattop**				33	8	102	6¼
Coal				0	8½	103	2¾
Slate				0	1¾	103	4½
Coal				0	2¼	103	6¾
Shale, dark, fire clay seams				3	0	106	6¾
Coal, bony, dark				0	2	106	8¾
Shale, dark				0	7¼	107	4
Shale, sandy				9	5¼	116	9¼
Slate, with fire clay				1	0	117	9¼
Coal				1	1	118	10¼
Fire clay				0	1½	118	11¾
Shale, dark, sandy				38	1½	157	1 (?)
Coal				0	3	157	4
Coal and bone				0	5	157	9
Shale, light				1	9¾	159	7 (?)
Shale, dark, oily				0	6	160	1
Shale, dark				2	0	162	10¼ (?)
Shale, sandy				2	10	165	8¼
Shale, light				11	1½	176	10¾
Slate, draw				0	1½	176	11¼
Coal, clean, No. 6 Pocahontas (2975')				3	1½	180	1¼
Shale, sandy				8	6⅛	188	7½ (?)
Coal	1'	0½"					
Bone	0	1					
Coal	0	2½					
Bone	0	2¼					
Coal	0	8					
Slate and fire clay	1	10	**No. 6 Pocahontas**	5	7½	194	3¼ (?)
Coal	0	3½					
Slate	0	2¼					
Coal	0	1¼					
Slate	0	2					
Coal	0	10					
Shale, sandy				23	6¾	217	10
Bone				0	0½	217	10½
Shale, dark				1	5	219	3½
Bone				0	2½	219	6
Coal, No. 5 Pocahontas				0	5	219	11
Shale, dark				3	9	223	8
Sandstone				5	8	229	4
Shale, sandy				5	2	234	6

	Thickness. Ft.	In.	Total. Ft.	In.
Sandstone	4	0	238	6
Shale, sandy	9	4	247	10
Shale, dark	9	0¼	256	10¼
Coal, No. 4 Pocahontas	2	1	258	11¼
Shale, dark	3	3	262	2¼
Sandstone, **Upper Pocahontas**	18	4	280	6¼
Shale, slaty	0	1½	280	7¾
Coal 0′ 2″				
Bone 0 1				
Coal 0 11½				
Shale, dark 0 1½ — **No. 3 Pocahontas** (2783′)	2	0½	282	8¼
Coal 0 3				
Bone and **coal** 0 5½				
Shale, light	4	4¾	287	1
Shale, dark	5	11	293	0
Slate and fire clay	0	8½	293	8½
Shale, dark	4	7½	298	4
Shale, gray, sandy	6	2	304	6
Sandstone, **Lower Pocahontas**	25	1¼	329	7¼
Shale, dark, slaty	0	6¼	330	1½
Coal, No. 2 Pocahontas	0	6¼	330	7¾
Shale, gray, sandy	46	7¼	377	3
Shale, dark, slaty	0	11	378	2
Coal, No. 1 Pocahontas	0	7	378	9
Shale, sandy	45	3	424	0
Fire clay and shale	0	6	424	6
Shale and fire clay, dark, sandy	3	9	428	3
Mauch Chunk Series (14′+)				
Shale, red and gray	10	6	438	9
Shale, and fire clay, soft, gray	4	0	442	9

Bellwood Coal Company Coal Test Boring No. 7—No. 145 on Map II.

Fayette County, Quinnimont District; 2 miles south of Bellwood and 0.65 mile southeast of Quinton School; started, May 18, 1935; completed, May 23, 1935; elevation, 3104.85′ L.

	Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (143′+)				
Surface, sand boulders, and clay	12	6	12	6
Coal, No. 8 Pocahontas	2	0	14	6
Fire clay	1	6	16	0
Sandstone, **Flattop**	29	7	45	7
Coal	0	5	46	0
Fire clay	1	6	47	6
Shale, dark	7	0	54	6
Coal	0	1	54	7
Shale, dark, soft	0	5	55	0
Coal	0	2	55	2
Fire clay	1	0	56	2
Shale, dark	7	6	63	8
Coal	0	2	63	10
Fire clay	0	10	64	8
Coal	0	8	65	4
Shale, dark, hard	15	8	81	0

				Thickness.		Total.	
				Ft.	In.	Ft.	In.
Shale, dark				5	0	86	0
Coal				0	1	86	1
Shale, dark				1	3	87	4
Bone				0	4	87	8
Shale, dark				5	7	93	3
Shale, dark, soft				1	0	94	3
Shale, dark				3	0	97	3
Shale, sandy				1	5	98	8
Shale, black				0	8	99	4
Coal				1	0	100	4
Fire clay				4	2	104	6
Shale, light, sandy				9	6	114	0
Shale, with streaks of sand				4	0	118	0
Shale, with streaks of dark-gray				16	2	134	2
Coal	0′	5″					
Bone	0	3					
Coal	4	2					
Shale, dark	1	0					
Bone coal	0	3					
Coal	0	2	No. 6 Poca-				
Shale, dark	0	3	hontas (2962.5′)	8	2	142	4
Coal	0	1					
Shale, dark	0	2					
Coal	0	6					
Shale, dark	0	7					
Coal	0	4					
Shale, dark				0	8	143	0

Bellwood Coal Company Coal Test Boring No. 9—No. 146 on Map II.

Fayette County, Quinnimont District; 2.1 miles northwest of Springdale and 0.75 mile southeast of Quinton School; started, June 8, 1935; completed, June 17, 1935; elevation, 3155.45′ L.

				Thickness.		Total.	
Pottsville Series (180′+)				Ft.	In.	Ft.	In.
Clay, yellow				12	0	12	0
Shale, dark				3	0	15	0
Sandstone	9′	0″					
Shale, dark	1	0	Pineville	26	9	41	9
Sandstone	16	9					
Shale, dark, soft				5	0	46	9
Coal, No. 9 Pocahontas				0	3	47	0
Shale, sandy				8	0	55	0
Shale, dark				4	0	59	0
Coal, No. 8 Pocahontas				1	6	60	6
Sandstone, Flattop				26	2	86	8
Coal				0	4	87	0
Fire clay				3	6	90	6
Shale, dark, sandy				7	6	98	0
Shale, dark, soft				1	0	99	0
Shale, sandy				9	0	108	0
Shale, black				0	6	108	6
Shale, dark				1	6	110	0

				Thickness. Ft.	In.	Total. Ft.	In.
Coal				0	8	110	8
Bone				0	3	110	11
Coal				0	3	111	2
Fire clay				1	10	113	0
Shale, dark				7	7	120	7
Coal				0	5	121	0
Shale, dark				5	0	126	0
Coal				0	1	126	1
Shale, dark				10	11	137	0
Shale, dark, sandy				3	0	140	0
Shale, hard, streaks of sand				15	0	155	0
Coal				2	0	157	0
Fire clay				1	0	158	0
Shale, light, sandy				4	0	162	0
Shale, dark				4	9	166	9
Coal	0′	3″					
Bone	0	3					
Coal	4	0					
Fire clay	1	3					
Coal	0	1					
Shale	0	2					
Coal	1	0	No. 6 Poca-				
Fire clay	0	10	hontas (2976′)	10	4	177	1
Coal	0	1					
Fire clay or soft gray shale	1	2					
Coal	0	2					
Fire clay	1	0					
Coal	0	1					
Shale, gray				2	11	180	0

Bellwood Coal Company Coal Test Boring No. 10—No. 147 on Map II.

Fayette County, Quinnimont District; 1.9 miles northwest of Springdale and 0.9 mile southeast of Quinton School; started, June 20, 1935; completed, June 27, 1935; elevation, 3192′ L.

Pottsville Series (208′+)				Thickness. Ft.	In.	Total. Ft.	In.
Clay, yellow				4	0	4	0
Shale, soft, yellow				8	0	12	0
Shale, dark				17	0	29	0
Sandstone, hard	16′	0″					
Sandstone, hard, broken	15	0	Pineville	31	0	60	0
Shale, dark				5	4	65	4
Coal, No. 9 Pocahontas				1	0	66	4
Fire clay				0	8	67	0
Shale, light, sandy				2	4	69	4
Coal				0	2	69	6
Sandstone				0	6	70	0
Sandstone, hard				5	6	75	6
Shale, dark, sandy				9	6	85	0
Coal, No. 8 Pocahontas				1	3	86	3

				Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Shale, dark, sandy				7	9	94	0
Shale, sandy				2	0	96	0
Sandstone, light-gray, Flattop				16	0	112	0
Coal				0	9	112	9
Shale, dark				10	3	123	0
Shale, sandy				3	0	126	0
Shale, dark				2	6	128	6
Shale, black				1	0	129	6
Coal				0	10	130	4
Shale, dark				7	8	138	0
Coal				0	6	138	6
Shale, sandy				3	6	142	0
Shale, dark				10	0	152	0
Shale, sandy				5	10	157	10
Coal				0	8	158	6
Fire clay				1	6	160	0
Shale, dark				4	6	164	6
Shale, sandy				2	6	167	0
Sandstone, Pierpont				11	6	178	6
Shale, dark-blue				19	9	198	3
Coal	0′	5″	No. 6 Pocahontas (2984′)	9	9	208	0
Bone	0	3					
Coal	4	2					
Shale, dark	1	2					
Coal, bone, and slate	1	2					
Shale, dark	0	8					
Bone, coal	0	4					
Shale, dark	0	8					
Coal	0	2					
Shale, dark	0	7					
Coal	0	2					
Shale, dark				0	6	208	6

Bellwood Coal Company Coal Test Boring No. 8—No. 148 on Map II.

Fayette County, Quinnimont District; 2.1 miles northwest of Springdale and 0.75 mile south-southwest of Quinton School; started, May 27, 1935; completed, June 6, 1935; elevation, 3158.7′ L.

Pottsville Series (195′+)				Thickness. Ft.	Thickness. In.	Total. Ft.	Total. In.
Boulders and clay				5	0	5	0
Sandstone, broken	7′	0″	Pineville	26	0	31	0
Sandstone	19	0					
Shale, dark, with sandy streaks				23	0	54	0
Shale, dark				6	0	60	0
Coal, No. 9 Pocahontas				0	6	60	6
Shale, dark				14	6	75	0
Coal, No. 8 Pocahontas				2	0	77	0
Sandstone	7′	0″	Flattop	39	6	116	6
Sandstone, light-gray	12	0					
Sandstone, light	14	0					
Sandstone, broken	6	6					

				Thickness. Ft.	In.	Total. Ft.	In.
Shale, black, soft				2	0	118	6
Fire clay				1	6	120	0
Shale, dark				17	4	137	4
Shale, sandy				1	6	138	10
Sandstone				3	6	142	4
Shale, black				0	2	142	6
Coal				0	3	142	9
Fire clay				5	3	148	0
Shale, dark				12	9	160	9
Shale, with streaks of sand				3	0	163	9
Sandstone, light-gray, Pierpont				4	0	167	9
Shale, black				2	3	170	0
Shale, dark-gray				11	0	181	0
Shale, gray, "slippery"				2	0	183	0
Coal	5′	0″	No. 6 Pocahontas (2966′)	9	10	192	10
Fire clay	1	4					
Coal	0	5					
Fire clay	0	8					
Coal	0	2					
Fire clay	1	2					
Coal	0	1					
Fire clay	0	10					
Coal	0	2					
Fire clay				1	9	194	7

Bellwood Coal Company Coal Test Boring No. 12—No. 149 on Map II.

Fayette County, Quinnimont District; 2.5 miles northwest of Springdale and 1.05 miles south of Quinton School; started, July 17, 1935; completed, July 25, 1935; elevation, 3152.9′ L.

				Thickness. Ft.	In.	Total. Ft.	In.
Pottsville Series (206′+)							
Clay, yellow				5	0	5	0
Sandstone, yellow	18′	0″	Pineville	66	0	71	0
Sandstone, light-gray, yellow streaks	25	0					
Sandstone, light-gray	23	0					
Shale, dark, soft				16	0	87	0
Shale, gray, sandy				3	9	90	9
Coal, No. 8 Pocahontas				2	1	92	10
Fire clay				0	8	93	6
Shale, sandy				6	6	100	0
Sandstone	5′	0″	Flattop	15	0	115	0
Sandstone, light-gray	10	0					
Shale, dark				0	3	115	3
Coal				0	3	115	6
Shale, dark, very soft				6	6	122	0
Shale, blue, sticky				15	9	137	9
Coal				1	5	139	2
Fire clay and dark shale				12	10	152	0
Sandstone, gray				5	10	157	10
Coal				0	6	158	4
Fire clay				5	8	164	0

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, gray, sandy	19	0	183	0
Sandstone, light-gray, hard	10	0	193	0
Shale, dark, soft	1	8	194	8
Coal, 3" bone near top 4' 9"; Shale, dark, soft 1 7; Coal 1 0 — No. 6 Pocahontas (2951')	7	4	202	0
Fire clay, small seams of coal and clay	4	9	206	9

Bellwood Coal Company Coal Test Boring No. 3— No. 150 on Map II.

Fayette County, Quinnimont District; 2.7 miles south of Bellwood and 2.2 miles northwest of Springdale; drilled in March, 1928; elevation, 3196.97' L.

Pottsville Series (201'+)	Thickness. Feet.	Total. Feet.
Surface	7.50	7.50
Sandstone, brown	21.50	29.00
Sandstone, very hard, light-gray	34.00	63.00
Sandstone, light-gray	37.00	100.00
Sandstone, dark-gray, coarse	1.05	101.05
Coal, No. 7 Pocahontas	1.03	102.08
Shale, fire clay	1.70	103.78
Sandstone, light-gray, coarse	13.82	117.60
Fire clay and shale	1.50	119.10
Slate	0.67	119.77
Coal and fire clay	1.58	121.35
Shale, gray, sandy	12.75	134.10
Fire clay and shale	5.50	139.60
Sandstone, light, coarse	4.50	144.10
Shale, gray, sandy	4.08	148.18
Slate and fire clay	1.25	149.43
Bone and fire clay	0.67	150.10
Fire clay and shale	5.08	155.18
Shale, gray, sandy	3.42	158.60
Bone and coal	0.50	159.10
Shale, gray, sandy	12.48	171.58
Coal	0.97	172.55
Bone	0.04	172.59
Coal	0.42	173.01
Bone	0.08	173.09
Fire clay, crumbly shale	0.12	173.21
Fire clay, light slaty shale	12.21	185.42
Shale, dark, slaty	2.00	187.42

			Thickness. Feet.	Total. Feet.
Coal	0.46′	No. 6 Pocahontas (3000′)	10.33	196.75
Bone	0.14			
Coal	3.04			
Bone	0.17			
Coal	0.10			
Bone	0.17			
Shale, fire clay, slaty	2.00			
Coal	0.08			
Bone and slate	0.08			
Coal	0.17			
Bone	0.08			
Slate	1.17			
Coal	1.29			
Shale, slaty	0.39			
Coal	0.14			
Bone and slate	0.21			
Fire clay, slaty	0.58			
Coal	0.06			
Fire clay, shaly			4.35	201.10

Bellwood Coal Company Coal Test Boring No. 11—No. 151 on Map II.

Fayette County, Quinnimont District; 2.1 miles northwest of Springdale, and 0.95 mile south of Quinton School; started, June 29, 1935; completed, July 8, 1935; elevation, 3144.2′ L.

Pottsville Series—Pocahontas Group (145.5′+)				Thickness. Ft.	In.	Total. Ft.	In.
Sand boulders and yellow clay				5	0	5	0
Sandstone, yellow	4′	0″	Flattop	56	0	61	0
Sandstone	3	0					
Sandstone, hard, gray	15	0					
Sandstone, hard	5	0					
Sandstone, broken	14	0					
Sandstone	15	0					
Slate, blue				7	6	68	6
Coal, No. 7 Pocahontas?				4	2	72	8
Shale, dark, sandy				3	3	75	11
Coal				0	1	76	0
Sandstone, conglomerate	5′	0″	Pierpont	16	0	92	0
Shale, light, sandy	2	0					
Sandstone, gray	9	0					
Coal				0	1	92	1
Fire clay				1	5	93	6
Coal				2	0	95	6
Fire clay and shale				5	6	101	0
Shale, dark				4	0	105	0
Slate, black, with coal partings				2	0	107	0
Shale, dark, sandy				9	0	116	0
Shale, hard, sandy				6	6	122	6
Coal				2	0	124	6
Shale, gray, sandy				7	6	132	0

	Thickness. Ft.	In.	Total. Ft.	In.
Shale, dark, slick	2	6	134	6
Coal and bone, No. 6 Pocahontas (3005′)	4	9	139	3
Shale, fire clay, and coal	6	3	145	6

Bellwood Coal Company Coal Test Boring No. 2— No. 152 on Map II.

Fayette County, Quinnimont District; 2.6 miles south of Bellwood and 1.8 miles northwest of Springdale; drilled in March, 1928; elevation, 3195.96′ L.

Pottsville Series (184′+)	Thickness. Feet.	Total. Feet.
Surface	16.00	16.00
Coal, Fire Creek	1.08	17.08
Sandstone, hard 35.42′ Sandstone 17.00 } Pineville?	52.42	69.50
Shale, dark	0.42	69.92
Coal, No. 8 Pocahontas?	0.58	70.50
Fire clay and shale	3.00	73.50
Shale, sandy	4.50	78.00
Sandstone	7.58	85.58
Coal	0.34	85.91
Fire clay and soft shale	0.42	86.33
Fire clay	0.42	86.75
Fire clay and soft shale	0.58	87.33
Fire clay and shale	7.67	95.00
Shale, sandy	12.42	107.42
Shale, soft, sandy, and fire clay	1.00	108.42
Coal	0.91	109.33
Shale, soft, and fire clay	0.50	109.83
Shale, sandy	3.42	113.25
Shale and fire clay, soft	4.67	117.92
Shale, sandy	4.18	122.10
Shale, dark, sandy	1.25	123.35
Shale, soft, dark	1.25	124.60
Sandstone, light	1.75	125.35
Shale, dark, soft, crumbly	6.79	132.14
Sandstone	0.50	132.64
Shale, soft, dark, crumbly	3.48	136.12
Shale, light, sandy	5.50	141.62
Sandstone	7.25	148.87
Shale, sandy	16.76	165.63
Shale, soft, dark, slaty, and crumbly	2.17	167.80
Coal 0.25′ Bone 0.29 **Coal** 3.71 Shale, light, slaty 2.27 **Coal** 1.29 Shale, slaty, and fire clay 0.91 **Coal** 0.20 } **No. 6 Pocahontas (3019′)**	8.92	176.72
Fire clay, slaty	1.55	178.27
Shale, slaty	5.45	183.72

MINABLE COALS, NEW RIVER GROUP OF POTTSVILLE SERIES.

SEWELL COAL.

The Sewell Coal previously discussed in Chapter VI, pages 229-234, is the uppermost minable coal bed in the New River Group in Greenbrier County. It is usually multiple-bedded, soft and columnar, with a thickness varying from 2 to 9 feet. The coal lumps fairly well when mined and its very low ash and low sulphur content make it an excellent domestic fuel. The volatile matter ranges from 23 to 28 per cent. In B. T. U. it usually is above 14,500 and may exceed 15,000. The fusion temperature of the ash appears to vary somewhat but is generally between 2,100° F. and 2,700° F. Commercial production from this seam began in 1910 and has continued to date.

The Sewell bed is by far the most continuous member of the Pottsville Series of this county and its position with respect to sea-level is indicated on Map II by the green structure contours. The outcrop of this seam, outlined in blue, and the location of numerous prospect openings and mines are also given on Map II. Figure 17 shows the probable area of minable Sewell Coal.

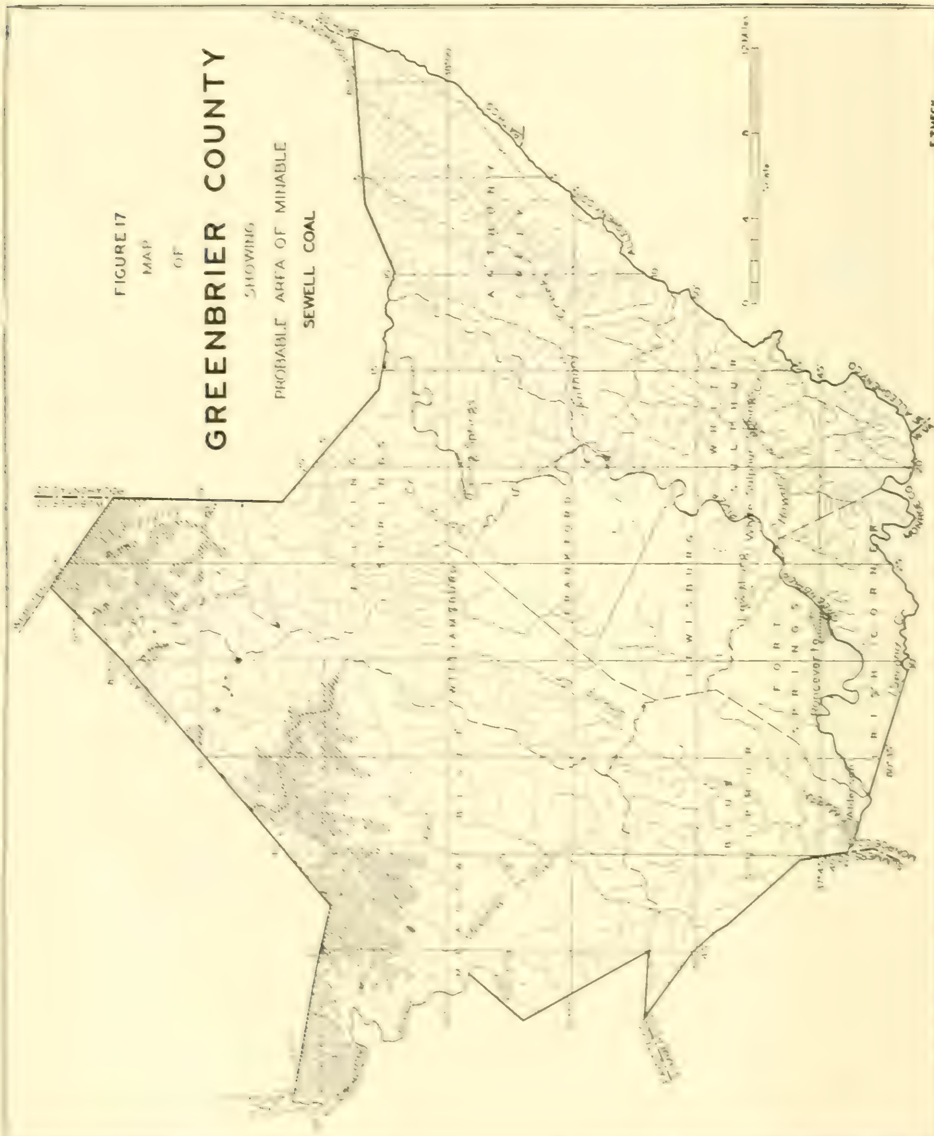


FIGURE 17
MAP
OF
GREENBRIER COUNTY
SHOWING
PROBABLE AREA OF MINABLE
SEWELL COAL

Sewell Coal, Meadow Bluff District.

In this district, the Sewell Coal was noted in the Duo Section as 3½ feet thick, in the Charmco Section as 6.1 feet thick, and in Coal Test Borings Nos. 5E, 5J, 5K, 5L, 5M, 6, 7, 8, 9, 10, and 11, the details of which have been given on preceding pages.

The Summarized Records of Borings, on pages 386-389, as also the detailed core test records for Fayette and Nicholas Counties, will give additional information regarding this coal in adjacent areas.

All of the Sewell Coal now produced in the county is mined in Meadow Bluff District. The large commercial mines on Meadow Creek and Big Clear Creek produced a total of 1,768,016 tons from this seam in 1936.

In the extreme western part of the county the Sewell Coal is of doubtful value. Little or no prospecting has been done in that area but judging from cores and exposures in Nicholas and Fayette Counties the Sewell Coal will probably be found to be thin and split with partings. The westernmost openings are as follows:

Abraham Nutter Mine—No. 10 on Map II.

Farm mine, located 0.35 mile west of Nutter School and 0.9 mile east of Nutterville; Sewell Coal; elevation, 2735′ B.

	Ft.	In.
Coal, reported, 1′ 9″ to	1	10

The following mine was previously reported by Reger on page 709 in the Nicholas County Report:

Johnson Nutter Mine—No. 11 on Map II.

Farm mine, on a branch of Anglins Creek, 1.8 miles S. 87° E. of Nutterville; Sewell Coal; elevation, 2705′ B.

	Ft.	In.
Fallen shut, coal, reported, 1′ 7″ to	1	9

Pascual and James Nutter Mine—No. 12 on Map II.

Farm mine, 0.65 mile east of Nutter School and 1.8 miles east of Nutterville; Sewell Coal?; elevation, 2770′ B.

	Ft.	In.
Coal, reported good, with thickness of	1	10

Two and one-half miles southeast on Burdette Creek the Gauley Coal Land Company's map shows the following:

Gauley Coal Land Company Prospect No. 252—No. 13 on Map II.

On the head of Burdette Creek, 3.9 miles north-northeast of Charmco; Sewell Coal; elevation, 2863′ B.

			Ft.	In.
Coal	2′	7″		
Coal and slate	0	8		
Coal	1	0	4	3

Gauley Coal Land Company Prospect No. 251—No. 14 on Map II.

On the south side of Burdette Creek, 2.2 miles northwest of Charmco; Sewell Coal; elevation, 2820′ B.

			Ft.	In.
Coal	2′	4″		
Coal and slate	2	0		
Coal	1	1	5	5

Gauley Coal Land Company Prospect No. 245—No. 15 on Map II.

On the waters of Burdette Creek, 1.8 miles northwest of Charmco; Sewell Coal; elevation, 2896′ B.

			Ft.	In.
Coal	2′	4″		
Coal and slate	0	4		
Slate	1	5		
Coal	1	2	5	3

One and one-half miles southwest the following three sections were measured by Price:

Haines Mine—No. 16 on Map II.

Farm mine, on the west side of Beargarden Knob, 3 miles northwest of Charmco; on property of J. C. Dixon; Sewell Coal; elevation, 2850′ B.

			Ft.	In.
1. Slate roof, good (fossil collection 144)			....	....
2. Coal, bright, laminated with fusain (mineral charcoal)	1′	7″		

			Ft.	In.
3. Coal, bony, bright, laminated with bone	3	0		
4. Coal, good (slate floor)	0	6	5	1

A sample (No. 158PH) was collected from No. 2 of section, the analysis of which is given under **No. 16** in the Table of Coal Analyses at the end of this Chapter.

E. M. Boyer Mine—No. 17 on Map II.

Farm mine, 1.2 miles southeast of Bingham and 2.6 miles northwest of Charmco; Sewell Coal; elevation, 2915′ B.

			Ft.	In.
Bone, dull (shale roof; fossil collection 146)	0′	4″		
Coal, good, laminated	1	6	1	10
Shale and bony coal				

H. J. and W. A. Pitzenbarger Mine—No. 18 on Map II.

Farm mine, on the east side of Beargarden Knob 2.4 miles northwest of Charmco; Sewell Coal; elevation, 2885′ B.

			Ft.	In.
1. Shale roof, (fossil collection 145)			....	....
2. Coal, hard, dull, bony, grading downwards into clean coal	0′	4″		
3. Coal, blocky	2	0	2	4
4. Coal, and shale floor, thickness undetermined				

A sample (No. 159PH) was collected from Nos. 2 and 3 of section, the analysis of which is published under **No. 18** in the Table of Coal Analyses at the end of this Chapter.

The following sections show the eastward thinning of the parting:

Gauley Coal Land Company Prospect No. 225— No. 19 on Map II.

On the north side of Meadow Creek, 0.8 mile west of Bellburn and 2.85 miles north-northwest of Charmco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 2917′ B.

			Ft.	In.
Coal	2′	11″		
Slate	0	1¼		
Coal	1	2	4	2¼

Gauley Coal Land Company Prospect No. 224—No. 20 on Map II.

On the north side of Meadow Creek, 0.85 mile west of Bellburn and 2.6 miles north-northwest of Charmco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 2931′ B.

			Ft.	In.
Coal	2′	6″		
Bone and slate	0	6		
Coal	1	2	4	2

Gauley Coal Land Company Prospect No. 223—No. 21 on Map II.

On the north side of Meadow Creek, 1.05 miles southwest of Bellburn and 2.25 miles north-northwest of Charmco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 2946′ B.

			Ft.	In.
Coal	2′	7″		
Bone and slate	0	5		
Coal	1	5	4	5

Gauley Coal Land Company Prospect No. 222—No. 22 on Map II.

On the north side of Meadow Creek, 1.1 miles southwest of Bellburn and 2 miles north-northwest of Charmco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 2963′ B.

			Ft.	In.
Coal	1′	5″		
Bone and slate	0	6		
Coal	1	5	3	4

Gauley Coal Land Company Prospect No. 221—No. 23 on Map II.

On the northwest side of Meadow Creek, 0.5 mile southwest of Bellburn, Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 2941′ B.

	Ft.	In.
Coal	4	1

Gauley Coal Land Company Prospect No. 220—No. 24 on Map II.

On the northwest side of Meadow Creek 0.2 mile southwest of Bellburn; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 2959′ B.

	Ft.	In.
Coal	4	0

Greenbrier Smokeless Coal Company "Crichton No. 2" Mine—No. 25 on Map II.

Formerly known as "Bellburn" and prior to 1927 as the "Greenbrier" mine; on the northwest side of Meadow Creek, 0.4 mile north-northwest of Bellburn; **Sewell Coal**; elevation of mine entry, 2921′ L.

Location of section; No. 1 Entry, 1st left, 2nd panel, room No. 9; elevation at point of sampling, 2913′ L.

			Ft.	In.
1. **Coal**, hard, columnar (slate roof)	0′	10½″		
2. **Coal**, soft, laminated with fusain (mineral charcoal)	1	6½		
3. **Coal**, laminated with bone, (discarded in mining)	0	8		
4. **Coal**, soft, columnar	1	1¼	4	2¼

A sample (No. 90PH) was taken from Nos. 1, 2, and 4 of section, the analysis of which is given under **No. 25** in the Table of Coal Analyses at the end of this Chapter.

Location of section; No. 2 Entry, 4th right, 6th panel, room No. 17; elevation at point of sampling, 2924′ L.

			Ft.	In.
1. **Coal**, columnar, hard (slate roof)	1′	1″		
2. **Coal**, soft, laminated with fusain (mineral charcoal)	1	10		
3. Slate, (discarded in mining)	0	4½		
4. **Coal** soft, laminated with "mother of **coal**"	0	11	4	2½

A sample (No. 91PH) was taken from Nos. 1, 2, and 4 of section, the analysis of which is given under **No. 25** in the Table of Coal Analyses at the end of this Chapter.

Post-office address, Crichton; shipping point, Bellburn; superintendent of mine, J. B. Penman; on Nicholas, Fayette, and Greenbrier Railroad.

Gauley Coal Land Company Prospect No. 217—No. 26 on Map II.

On the northwest side of Meadow Creek, 0.1 mile north of Bellburn; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2941′ B.

	Ft.	In.
Coal	4	5

Gauley Coal Land Company Prospect No. 216—No. 27 on Map II.

On the northwest side of Meadow Creek, 0.4 mile northeast of Bellburn; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2959′ B.

			Ft.	In.
Coal			3	6

Johnstown Coal & Coke Company "Crichton No. 1" Mine—No. 28 on Map II.

Prior to 1927, known as the Meadow Creek Coal Company; on the north side of Meadow Creek at Crichton; **Sewell Coal**; elevation of mine opening, 2965′ L.

Location of sample; 10th right off air-coarse, 1st parallel, 3600′ 5° E. of N. of mine entry; elevation at point of sampling, 2875′ L.

			Ft.	In.
1. **Coal**, medium-hard, columnar (slate roof)	1′	3″		
2. **Coal**, soft, laminated with fusain (mineral charcoal)	2	3		
3. Bone parting	0	11		
4. **Coal**, soft	0	9	5	2

A sample (No. 88PH) was taken from Nos. 1, 2, and 4 of section, the analysis of which is given under **No. 28** in the Table of Coal Analyses at the end of this Chapter.

Location of sample; 9th right off main heading, room No. 11; 700′ S. W. of No. 88PH; elevation at point of sampling, 2864.39′ L.

			Ft.	In.
Coal, medium-hard, columnar (slate roof)	1′	10″		
Coal, soft, laminated with fusain (mineral charcoal)	1	0		
Coal, soft, columnar	0	7		
Coal, hard, some bone at base (1″ to 2″)	1	0	4	5

A sample (No. 89PH) was taken from the above section and its analysis is published under **No. 28** in the Table of Coal Analyses at the end of this Chapter.

Shipping point and post office address, Crichton; superintendent of mine, J. B. Penman; on Nicholas, Fayette, and Greenbrier Railroad.

Gauley Coal Land Company Prospect No. 212—No. 29 on Map II.

On the north side of Meadow Creek, 0.35 mile west of Quinwood; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 2990′ B.

			Ft.	In.
Coal	0′	7″		
Slate	0	3		
Coal	0	3		
Slate	0	11		
Coal	5	4	7	4

The output from the following openings of the Imperial Smokeless Coal Company is given in the tables of coal production under the "Quinwood" mine.

Imperial Smokeless Coal Company Mine No. 1 (Pony)—No. 30 on Map II.

On the north side of Meadow Creek, 0.25 mile east of Quinwood; section from mine map; Sewell Coal; elevation, 3016′ L.

	Ft.	In.
Coal, with a little bony coal at top and bottom	7	0

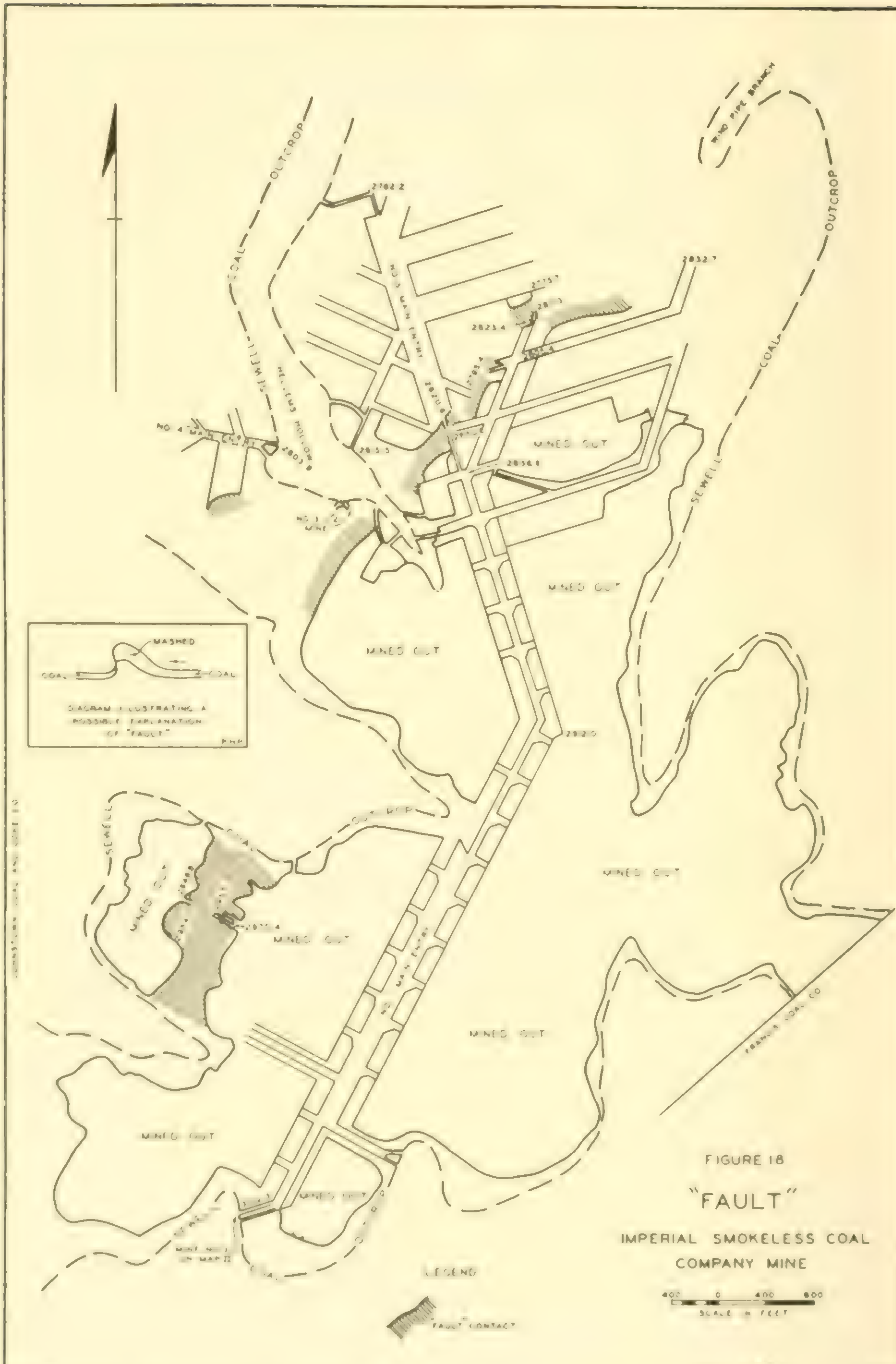
Imperial Smokeless Coal Company Mine No. 1—No. 31 on Map II.

On the north side of Meadow Creek, 0.25 mile east of Quinwood; Sewell Coal; elevation, of mine mouth, 3012.3′ L.

Location of sample; right main; between 14th and 15th right; elevation of sample, 2866′ L.

			Ft.	In.
Coal, soft, with thin bony partings (slate roof)	0′	6″		
Coal, hard	0	10		
Coal, soft, columnar	1	8		
Coal, medium-hard	1	1		
Coal, hard, columnar	1	8		
Coal, hard	0	7	6	4

A sample (No. 81PH) was taken from the above section and its analysis is published under **No. 31** in the Table of Coal Analyses at the end of this Chapter.



COAL OUTCROP
SEWELL
No. 4 MAIN ENTRY
No. 3 MAIN ENTRY
MINES OUT
WASHED
COAL
COAL
DIAGRAM ILLUSTRATING A POSSIBLE EXPLANATION OF "FAULT"
MAIN ENTRY
SEWELL COAL
OUTCROP
WIND PIPE BRANCH
SEWELL COAL OUTCROP
MINES OUT
MINES OUT
MINES OUT
MINES OUT
MINES OUT
MINES OUT
MINES OUT
LEGEND
FAULT CONTACT
FIGURE 18
"FAULT"
IMPERIAL SMOKELESS COAL COMPANY MINE
400 0 400 800
SCALE IN FEET
CEH

Imperial Smokeless Coal Company Mine No. 2 (Pony)—No. 32 on Map II.

On the north side of Meadow Creek, 0.6 mile east of Quinwood; section from mine map; **Sewell Coal**; elevation, 3030′ L.

	Ft.	In.
Coal	6	0

Imperial Smokeless Coal Company Mine No. 2—No. 33 on Map II.

On the north side of Meadow Creek, 0.6 mile east of Quinwood; **Sewell Coal**; elevation of mine opening, 3030′ L.

Location of section; head of 9th right off main entry.

			Ft.	In.
Coal, hard, good (slate roof)	1′	2″		
Coal, medium-hard, columnar	1	11		
Coal, hard, laminated with fusain (mineral charcoal) (lumps well)	1	0		
Coal, soft, columnar	2	6	6	7

A sample (No. 82PH) was taken from the above section and its analysis is published under **No. 33** in the Table of Coal Analyses at the end of this Chapter.

Post-office address and shipping point, Quinwood; superintendent of mine, V. A. Summerfield; on Nicholas, Fayette, and Greenbrier Railroad.

Frances Coal Company "Frances" Mine No. 1—No. 34 on Map II.

On the north side of Meadow Creek, 1.35 miles northeast of Quinwood; **Sewell Coal**; elevation at mine opening, 3160′ B.

Location of section; 2nd north, 3 panel, room 9.

			Ft.	In.
Coal, hard, columnar (slate roof)	1′	3″		
Coal, soft, laminated with fusain (mineral charcoal) (lumps well)	1	8		
Coal, soft, columnar	0	7		
Coal, medium-hard (slate floor)	1	5	4	11

A sample (No. 86PH) was taken from the above section and its analysis is published under **No. 34** in the Table of Coal Analyses at the end of this Chapter.

The Frances Coal Company has ceased operation (1936) and the mine has reverted to the owner, the Gauley Coal Land Company. The coal is largely exhausted but it is reported that there is still some recoverable coal on the property.

Gauley Coal Land Company Prospect No. 206—No. 35 on Map II.

On the north side of the head of Meadow Creek, 1.7 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3221′ B.

	Ft.	In.
Coal	3	10

Gauley Coal Land Company Prospect No. 205—No. 36 on Map II.

On the head of Meadow Creek, on the west side of Big Clear Creek Mountain, 1.75 miles east of Quinwood; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3284′ B.

	Ft.	In.
Coal	4	0

Gauley Coal Land Company Prospect No. 204—No. 37 on Map II.

On the south side of the head of Meadow Creek, 1.4 miles east of Quinwood; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3197′ B.

			Ft.	In.
Coal	1′	2″		
Slate	0	5		
Coal	5	1	6	8

About 3000 feet in from the mouth of the following mine a parting was noted about 14 inches from the top of the coal. This parting thickens to such an extent that the upper bench of coal is unrecoverable in some parts of the mine:

Margarette Coal Corporation "Margarette" Mine No. 2—No. 38 on Map II.

Successor to the Margarette Coal Company; located on the south side of Meadow Creek, 0.85 mile east of Quinwood; Sewell Coal; elevation of mine opening, 3125′ B.(?)

Location of sample; 2nd east at 3rd south.

			Ft.	In.
1. Coal, bony, laminated (slate roof, poor)	1′	2″		

				Ft.	In.
2.	Slate	4	0		
3.	Coal, medium-hard, columnar	1	3		
4.	Coal, soft, laminated (lumps well)	1	5		
5.	Coal, soft, columnar	1	11		
6.	Coal, bony, laminated (slate floor)	0	10	10	7

A sample (No. 84PH) was taken from Nos. 3, 4, and 5 of the above section, and its analysis is published under **No. 38** in the Table of Coal Analyses at the end of this Chapter.

Post-office address and shipping point, Marfrance; mine superintendent, G. B. Staley; on Nicholas, Fayette, and Greenbrier Railroad.

Gauley Coal Land Company Prospect No. 201—No. 39 on Map II.

On the south side of Meadow Creek, 0.65 mile southwest of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3133′ B.

	Ft.	In.
Coal	6	0

It is reported that the Burley Coal Company is operating the following mine under a sub-lease from the Margarette Coal Corporation and that the production in 1936 is credited under the Margarette Coal Corporation. In 1934 and 1935, however, its production was separately reported by the Department of Mines under the Burley Coal Company, Burley Mine:

Margarette Coal Corporation "Margarette" Mine No. 1—No. 40 on Map II.

On the south side of Meadow Creek, 0.55 mile southeast of Quinwood; **Sewell Coal**; elevation, 3120′ B.

Location of section; 1st panel, room 6.

				Ft.	In.
1.	Coal, bony	0′	1″		
2.	Coal, soft, laminated with fusain (mineral charcoal)	0	10		
3.	Coal, hard, columnar	1	11		
4.	Coal, soft, laminated (lumps well)	1	0		
5.	Coal, soft, columnar	1	7		
6.	Coal, bony (not mined)	0	4	5	9

A sample (No. 85PH) was taken from Nos. 2, 3, 4, and 5 of the above section and its analysis is published under **No. 40** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. 200— No. 41 on Map II.

On the south side of Meadow Creek, 0.6 mile southeast of Quinwood; Gauley Coal Land Company authority for this section, old opening; **Sewell Coal**; elevation, 3115′ B.

	Ft.	In.
Coal	4	11

New River & Pocahontas Consolidated Coal Company Mine No. 2, Abandoned—No. 42 on Map II.

On the south side of Meadow Creek, 0.3 mile southwest of Quinwood; **Sewell Coal**; elevation, 3059′ B?.

	Ft.	In.
Coal, worked out, thickness reported	6	6

The above mine was known as the "Nelson No. 2" of the Nelson Fuel Company prior to 1929.

Mines Nos. 43, 46, and 54 are interconnected and their production is reported to the Department of Mines under the Leslie Mine. Mine No. 46 was known as the "Nelson No. 1" of the Nelson Fuel Company prior to 1929.

Main office post-office address, Fayetteville, W. Va.; mine post-office address and shipping point, Leslie; mine superintendent, E. H. Marrs; on Nicholas, Fayette, and Greenbrier Railroad.

New River & Pocahontas Consolidated Coal Company Mine No. 3—No. 43 on Map II.

On the head of Little Fork of Meadow Creek, 0.65 mile southeast of Quinwood; **Sewell Coal**; elevation, 3135′ L.

Location of sample; main heading at property line.

			Ft.	In.
1. **Coal**, soft, laminated (slate roof)	1′	5″		
2. Slate parting	0	9		
3. **Coal**, hard, columnar	2	4		
4. **Coal**, laminated with fusain (mineral charcoal)	1	0		
5. **Coal**, soft, columnar	1	6		
6. **Coal**, bony (not mined)	1	2	8	2

A sample (No. 96PH) was taken from Nos. 1, 3, 4, and 5 of the above section, the analysis of which is published under **No. 43** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. 196—No. 44 on Map II.

On the south side of Little Fork of Meadow Creek, 0.6 mile south of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3100′ B.

			Ft.	In.
Coal			7	0

Gauley Coal Land Company Prospect No. 195—No. 45 on Map II.

On the south side of Little Fork of Meadow Creek, 3.5 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3016′ B.

			Ft.	In.
Coal	1′	0″		
Slate	0	2		
Coal	5	0	6	2

New River and Pocahontas Consolidated Coal Company Mine No. 1—No. 46 on Map II.

On the south side of Little Fork of Meadow Creek, 3.45 miles northeast of Charmco and 0.6 mile southwest of Quinwood; **Sewell Coal**; elevation, 2996′ L.

Location of sample; 5th right, No. 4 room.

			Ft.	In.
1. **Coal**, laminated with bone (slate roof)	0′	8″		
2. **Coal**, hard, columnar	1	10		
3. **Coal**, soft, laminated with fusain (mineral charcoal)	1	2		
4. **Coal**, soft, columnar	0	10		
5. Bone	0	2		
6. **Coal**, soft, laminated	1	0		
7. **Coal**, laminated with bone	0	8	6	4

A sample (No. 92PH) was taken from Nos. 2, 3, 4, and 6 of the above section, the analysis of which is published under **No. 46** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. 192—No. 47 on Map II.

On the south side of Little Fork of Meadow Creek, 3.35 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2976′ B.

			Ft.	In.
Coal	6′	2″		
Slate	1	0		
Coal	0	7	7	9

Gauley Coal Land Company Prospect No. 191—No. 48 on Map II.

On the east side of Meadow Creek, 3.2 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2947′ B.(?)

			Ft.	In.
Coal	5′	1″		
Slate	0	7		
Coal	0	7	6	3

Gauley Coal Land Company Prospect No. 190—No. 49 on Map II.

On the east side of Meadow Creek, 2.6 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3020′ B.(?); calculated from mine map, 2970′.

	Ft.	In.
Coal	4	6

Gauley Coal Land Company Prospect No. 188—No. 50 on Map II.

On the east side of Meadow Creek, 2.25 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3016′ B.

			Ft.	In.
Coal	0′	10″		
Slate	0	6		
Coal	4	3	5	7

Joe Neff Mine—No. 51 on Map II.

Truck mine on Snowden Crane property; on Laurel Creek Mountain, 1 mile south of Bellburn and 1.7 miles north of Charmco; **Sewell Coal**; elevation, 3065′ B.

			Ft.	In.
1. Coal, hard, laminated, and blocky (slate roof)	0′	11½″		

				Ft.	In.
2.	Shale parting, with **coal** streaks	0	4		
3.	**Coal**, columnar, soft	1	1		
4.	Fusain (mineral charcoal)	0	0¼		
5.	**Coal**, laminated bright and dull	0	11½		
6.	**Coal**, laminated, soft	0	4		
7.	**Coal**, hard	0	2		
8.	Shale parting, (reported by Joe Neff)	1	0		
9.	**Coal**, (reported by Joe Neff)	1	3	6	1¼

A sample (No. 157PH) was taken from Nos. 1, 3, 4, 5, 6, and 7 of the above section, the analysis of which is published under **No. 51** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. 187—No. 52 on Map II.

On the west side of Laurel Creek, 2.35 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3051′ B.

	Ft.	In.
Coal	6	4

Gauley Coal Land Company Prospect No. 186—No. 53 on Map II.

On the north side of the head of Laurel Creek, 2.9 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3088′ L.

	Ft.	In.
Coal	5	0

New River and Pocahontas Consolidated Coal Company Mine No. 4—No. 54 on Map II.

Near the head of Laurel Creek, 2.85 miles northeast of Charmco; **Sewell Coal**; elevation, 3120′ L.

Location of sample; 3rd right, No. 1 room.

				Ft.	In.
1.	Bone, (slate roof)	0′	3″		
2.	**Coal**, soft, laminated	1	5		
3.	**Coal**, hard, columnar	1	11		
4.	**Coal**, soft, laminated	0	9		
5.	**Coal**, soft, columnar	0	11		
6.	Bone	0	1	5	4

Three samples were taken from the above section; No. 93PH from No. 2 of section; No. 94PH from No. 3 of section, and No. 95PH from Nos. 4 and 5 of section. The analyses of these samples are published under **No. 54** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. 185—No. 55 on Map II.

On the east side of Laurel Creek, 2.4 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3104′ B.

			Ft.	In.
Coal	5′	2″		
Slate	0	4		
Coal	0	7	6	1

Gauley Coal Land Company Prospect No. 184—No. 56 on Map II.

On the east side of Laurel Creek, 2.5 miles northeast of Charmco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3159′ B.

	Ft.	In.
Coal	4	0

Gauley Coal Land Company Prospect No. 181—No. 57 on Map II.

On Mill Creek Mountain, 0.25 mile southwest of Big Branch School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3243′ B.

			Ft.	In.
Coal	4′	0″		
Coal and slate	0	8	4	8

Gauley Coal Land Company Prospect No. 180—No. 58 on Map II.

On the east side of Mill Creek Mountain 0.25 mile north of Big Branch School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3243′ B.

			Ft.	In.
Coal	1′	2″		
Slate	1	4		
Coal	4	6	7	0

Gauley Coal Land Company Prospect No. 179—No. 59 on Map II.

On the west side of Mill Creek, 0.6 mile northeast of Big Branch School; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3253′ B.

			Ft.	In.
Coal	2′	1″		
Slate	3	9		
Coal	3	11		
Coal and slate	1	8	11	5

Gauley Coal Land Company Prospect No. 178—No. 60 on Map II.

On the west side of Mill Creek, 1 mile northeast of Big Branch School; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3237′ B.

			Ft.	In.
Coal	4′	0″		
Coal and slate	2	0	6	0

Gauley Coal Land Company Prospect No. 167—No. 61 on Map II.

On the east side of Mill Creek, 1.4 miles northeast of Big Branch School; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3280′ B.

	Ft.	In.
Coal	5	4

Gauley Coal Land Company Prospect No. 164—No. 62 on Map II.

On the east side of Mill Creek, 1.1 miles northeast of Big Branch School; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3263′ L.

			Ft.	In.
Coal	5′	1″		
Coal and slate	0	10	5	11

Gauley Coal Land Company Prospect No. 163—No. 63 on Map II.

On the east side of Mill Creek, 1 mile northeast of Big Branch School; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3281′ L.

			Ft.	In.
Coal	4′	6″		
Coal and slate, laminated	1	6	6	0

Gauley Coal Land Company Prospect No. 162—No. 64 on Map II.

On the east side of Mill Creek, 1.35 miles northeast of Big Branch School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3320′ L.

	Ft.	In.
Coal	4	0

Gauley Coal Land Company Prospect No. 159—No. 65 on Map II.

On the west side of Rich Knob, 0.9 mile east of Big Branch School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3345′ L.

			Ft.	In.
Coal	4′	1″		
Coal and slate	1	9	5	10

Gauley Coal Land Company (?) Prospect No. 158—No. 66 on Map II.

On the south end of Rich Knob, 1.2 miles southeast of Big Branch School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3395′ L.

			Ft.	In.
Coal	4′	0″		
Slate	1	6		
Coal	2	0	7	6

Gauley Coal Land Company Prospect No. 157—No. 67 on Map II.

On the southeast side of Rich Knob, 0.7 mile west of the mouth of Brown Creek; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3422′ L.

	Ft.	In.
Coal	3	4

Gauley Coal Land Company Prospect No. 156—No. 68 on Map II.

On the east side of Rich Knob, 0.75 mile northwest of the mouth of Brown Creek; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3387′ L.

	Ft.	In.
Coal	3	9

The total output from mines and openings Nos. 69, 92, 93, 94, 95, and 96 are given in the tables of production statistics at the beginning of this Chapter under the "Leckie" mine.

Leckie Smokeless Coal Company "Big Mountain" Mine—No. 69 on Map II.

On the west side of Brown Creek, 1.2 miles northwest of mouth; section as shown on mine map 600′ W. of mouth of main entry; Sewell Coal; elevation, 3357′ L.

			Ft.	In.
Coal	3′	4″		
Bone	0	5		
Coal	2	2	5	11

Gauley Coal Land Company Prospect No. 154—No. 70 on Map II.

On the west side of Brown Creek, 1.4 miles north of mouth; Gauley Coal Land Company authority for this section ; Sewell Coal; elevation, 3374′ B.

			Ft.	In.
Coal	3′	4″		
Coal and slate	0	1		
Coal	1	9	5	2

Gauley Coal Land Company Prospect No. 153—No. 71 on Map II.

On the west side of Brown Creek, 1.8 miles northwest of mouth and 0.75 mile southeast of Sumac Knob; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3335′ L.

			Ft.	In.
Coal	0′	11″		
Sandstone	0	4½		
Coal	4	1		
Coal and slate	1	0	6	4½

Gauley Coal Land Company Prospect No. 152—No. 72 on Map II.

On the west side of Brown Creek, 2.1 miles northwest of mouth and 0.5 mile southeast of Sumac Knob; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3335′ B.

			Ft.	In.
Coal	0′	8″		
Sandstone	0	1½		
Coal	4	0		
Coal and slate	1	0	5	9½

Gauley Coal Land Company Prospect No. 151—No. 73 on Map II.

On the west side of Brown Creek, 2.4 miles northwest of mouth and 0.25 mile southeast of Sumac Knob; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3331′ B.

			Ft.	In.
Coal	4′	0″		
Coal and slate	1	0	5	0

Leckie Smokeless Coal Company Mine No. ?—No. 74 on Map II.

On the west side of Brown Creek, 2.7 miles north of mouth and 0.3 mile southwest of Brier Knob; Sewell Coal; elevation, 3353′ L.

	Ft.	In.
Coal, reported 3′ 0″ to	4	0

Gauley Coal Land Company Prospect No. 145—No. 75 on Map II.

On the west side of Brown Creek, 2.7 miles north of mouth; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3420′ B.

			Ft.	In.
Coal	3′	6″		
Coal and slate	1	2	4	8

Gauley Coal Land Company Prospect No. 144—No. 76 on Map II.

On the west side of Brown Creek, 3.1 miles north of mouth; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3420′ L.

	Ft.	In.
Coal	4	4

Gauley Coal Land Company Prospect No. 143—No. 77 on Map II.

On the west side of Brown Creek, 3.4 miles north of mouth; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3355′ B.

	Ft.	In.
Coal	4	5

Gauley Coal Land Company Prospect No. 142—No. 78 on Map II.

On the west side of Brown Creek, 3.6 miles north of mouth; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3349′ B.

	Ft.	In.
Coal	3	1

Gauley Coal Land Company Prospect No. 140—No. 79 on Map II.

On the west side of Brown Creek, 4 miles north of mouth; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3352′ B.

			Ft.	In.
Coal	1′	11″		
Slate	3	0		
Coal	2	3	7	2

Gauley Coal Land Company Prospect No. 138—No. 80 on Map II.

On the west side of Huggins Ridge near the head of Brown Creek, 2.6 miles northeast of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3348′ L.

	Ft.	In.
Coal	3	1

The topography as shown on the topographic map in the vicinity of Brown Creek does not conform to conditions found there. While topographic revision of this and adjoining areas has now been completed it was not possible to obtain the corrected editions in time for this report. An attempt was made to map the outcrop of the Sewell Coal in this region with regard to its correct areal position. Attention is called to the fact that the elevations of this outcrop line and of the prospect points do not conform to the elevations shown on the base map.

Gauley Coal Land Company Prospect No. 136—No. 81 on Map II.

On the west side of Huggins Ridge, 2.45 miles northeast of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3406′ L.

	Ft.	In.
Coal	2	9

Gauley Coal Land Company Prospect No. 135—No. 82 on Map II.

On the west side of Huggins Ridge, 2.35 miles northeast of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3427′ L.

		Ft.	In.
Coal		3	2

Gauley Coal Land Company Prospect No. 134—No. 83 on Map II.

On the west side of Huggins Ridge, 2.25 miles northeast of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3448′ L.

		Ft.	In.
Coal		3	2

Gauley Coal Land Company Prospect No. 133—No. 84 on Map II.

On the east side of Huggins Ridge, 2.05 miles northeast of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3503′ L.

		Ft.	In.
Slate	0′ 1½″		
Coal	1 10½	2	0

Gauley Coal Land Company Prospect No. 132—No. 85 on Map II.

On the east side of Huggins Ridge, 2 miles northeast of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3475′ L.

		Ft.	In.
Coal		3	8

Gauley Coal Land Company Prospect No. 131—No. 86 on Map II.

On the west side of Pollock Mountain, 3.9 miles north of Anjean; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3496′ L.

		Ft.	In.
Bone	0′ 7″		
Coal	4 2	4	9

Gauley Coal Land Company Prospect No. 130—No. 87 on Map II.

On the west side of Pollock Mountain, 3.75 miles north of Anjean; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3540′ L.

	Ft.	In.
Coal	3	1

Gauley Coal Land Company Prospect No. 129—No. 88 on Map II.

On the west side of Pollock Mountain, 3.65 miles north of Anjean; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3576′ L.

			Ft.	In.
Bone	1′	6″		
Coal	4	1	5	7

Gauley Coal Land Company Prospect No. 128—No. 89 on Map II.

On the west side of Pollock Mountain, 3.3 miles north of Anjean; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3555′ L.

	Ft.	In.
Coal	3	10

Gauley Coal Land Company Prospect No. 127—No. 90 on Map II.

On the west side of Pollock Mountain, 3.2 miles north of Anjean; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3548′ L.

	Ft.	In.
Coal	3	10

Gauley Coal Land Company Prospect No. 118—No. 91 on Map II.

On Pollock Mountain, 1.3 miles northwest of the mouth of Sam Creek and 2.8 miles north of Anjean; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3540′ L.

	Ft.	In.
Coal	4	0

Correspondence with Mr. W. W. Coleman, Chief Engineer of the Leckie Smokeless Coal Company, indicates that the elevations for mine openings Nos. 92, 93, 94, 95, and 96 as used in

making the geologic structure map are 17.57 feet too high. The correct elevations are given below.

The net result of this error is to shift the 3500-contour northeast until it goes between mines 92 and 93 instead of between 93 and 94. The 3450-contour should be moved east with a rather sharp bend to include, only, mine No. 95. The other contours are not materially affected.

Leckie Smokeless Coal Company Mine No. 5—No. 92 on Map II.

On the west side of Pollock Mountain, 2.5 miles north-northwest of Anjean; section as shown on mine map; **Sewell Coal**; elevation, 3519.3', less 17.57'=3501.73' **L.**

	Ft.	In.
Coal	5	1

Leckie Smokeless Coal Company Mine No. 4—No. 93 on Map II.

On the northwest side of Pollock Knob, 2.25 miles north-northwest of Anjean; section as shown on mine map; **Sewell Coal**; elevation, 3511.5', less 17.57'=3493.93' **L.**

	Ft.	In.
Coal	4	8

Leckie Smokeless Coal Company Mine No. 3—No. 94 on Map II.

On the west side of Pollock Knob, 2.1 miles north-northwest of Anjean; section as shown on mine map; **Sewell Coal**; elevation, 3482.3', less 17.57'=3464.73' **L.**

	Ft.	In.
Coal	4	6

Leckie Smokeless Coal Company Mine No. 2—No. 95 on Map II.

On the west side of Pollock Knob, 1.95 miles north-northwest of Anjean; **Sewell Coal**; elevation, 3467.2', less 17.57'=3449.63' **L.**

Location of sample; room number 11 off air-course.

			Ft.	In.
1. Coal, hard, dull	0'	4"		
2. Coal, columnar, soft	1	3		
3. Coal, medium-hard (lumps well)	1	7		
4. Coal, soft	2	3		
5. Coal, jet-black bands with thin streaks of bone (not mined)	1	1	6	6

A sample (No. 80PH) was taken from Nos. 1, 2, 3, and 4, of the above section, and its analysis is published under **No. 95** in the Table of Coal Analyses at the end of this Chapter.

Mine office and shipping point, Anjean; Chief Engineer, W. W. Coleman; mine superintendent, C. C. Wilburn; on Nicholas, Fayette, and Greenbrier Railroad.

Leckie Smokeless Coal Company Mine No. 1— No. 96 on Map II.

On the southwest side of Pollock Knob, 1.7 miles north-northwest of Anjean; section as shown on mine map; **Sewell Coal**; elevation, 3478.5′, less 17.57′=**3460.93′ L.**

	Ft.	In.
Coal	5	3

Gauley Coal Land Company (?) Prospect— No. 97 on Map II.

On the east side of Pollock Mountain, 2.35 miles north of Anjean; section as shown on Gauley Coal Land Company map; **Sewell Coal**; elevation, 3515′ L.

	Ft.	In.
Coal	4	5

Gauley Coal Land Company (?) Prospect— No. 98 on Map II.

On the east side of Pollock Mountain, 2.5 miles north of Anjean; section as shown on Gauley Coal Land Company map; **Sewell Coal**; elevation, 3523′ L.

	Ft.	In.
Coal	4	0

Gauley Coal Land Company Prospect No. 117— No. 99 on Map II.

On the east side of Pollock Mountain, 1.3 miles northwest of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3551′ L.

	Ft.	In.
Coal	4	6

Gauley Coal Land Company Prospect No. 116— No. 100 on Map II.

On the east side of Pollock Mountain, 1.4 miles northwest of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3574′ L.

	Ft.	In.
Coal	2	9

Gauley Coal Land Company Prospect No. 115—No. 101 on Map II.

On the east side of Pollock Mountain, 1.7 miles north of the mouth of Sam Creek; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3562' L.

			Ft.	In.
Coal	4'	0"		
Coal and bone	1	0	5	0

Gauley Coal Land Company Prospect No. 113—No. 102 on Map II.

On the west bank of Sam Creek, 2.1 miles north of its mouth and 1.85 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3514' L.

	Ft.	In.
Coal	3	0

Gauley Coal Land Company Prospect No. 112—No. 103 on Map II.

On the west bank of Sam Creek, 1.8 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3497' L.

			Ft.	In.
Coal	3'	6"		
Slate	0	6		
Coal	0	2	4	2

Gauley Coal Land Company Prospect No. 111—No. 104 on Map II.

On the west bank of Sam Creek, 1.9 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3483' L.

			Ft.	In.
Coal	3'	0"		
Bone	0	2	3	2

Gauley Coal Land Company Prospect No. 110—No. 105 on Map II.

On the west bank of Sam Creek, 1.9 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3487' L.

			Ft.	In.
Bone	0'	6"		
Coal	3	4½	3	10½

Gauley Coal Land Company Prospect No. 109—No. 106 on Map II.

On west side of Sam Ridge, 1.75 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3492′ L.

			Ft.	In.
Bone	1′	6½″		
Coal	3	2½	4	9

Gauley Coal Land Company Prospect No. 108—No. 107 on Map II.

On the west side of Sam Ridge, 1.7 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3429′ L? (3492′).

			Ft.	In.
Coal	3′	2″		
Slate	0	3		
Coal	0	6	3	11

Gauley Coal Land Company Prospect No. 107—No. 108 on Map II.

On the west side of Sam Ridge, 1.5 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3458′ L.

			Ft.	In.
Coal	0′	2″		
Slate	0	2		
Coal	3	4		
Bone	1	10	5	6

Gauley Coal Land Company Prospect No. 106—No. 109 on Map II.

On the west side of Sam Ridge, 1.4 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3448′ L.

			Ft.	In.
Slate	0′	9″		
Coal	3	6		
Bone	2	5	6	8

Gauley Coal Land Company Prospect No. 105—No. 110 on Map II.

On the west side of Sam Ridge, 1.2 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3491′ L.

			Ft.	In.
Slate	0′	5″		
Coal	3	4		
Bone	2	4	6	1

Gauley Coal Land Company Prospect No. 104—No. 111 on Map II.

On the west side of Sam Ridge, 1.3 miles west of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3486′ L.

			Ft.	In.
Slate	0′	5″		
Coal	3	3	3	8

Gauley Coal Land Company Prospect No. 103—No. 112 on Map II.

On the west side of Sam Ridge, 1.3 miles southwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3515′ L.

	Ft.	In.
Coal	3	1

Gauley Coal Land Company Prospect No. 102—No. 113 on Map II.

On the south end of Sam Ridge, 1 mile southwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3486′ L.

	Ft.	In.
Coal	3	10

Gauley Coal Land Company Prospect No. 101—No. 114 on Map II.

On the east side of Sam Ridge, 0.7 mile southwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3487′ L.

	Ft.	In.
Coal	3	10

Gauley Coal Land Company Prospect No. 100—No. 115 on Map II.

On the east side of Sam Ridge, 0.7 mile northwest of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3425′ L. (?) (3452′).

			Ft.	In.
Coal			3	9

Gauley Coal Land Company Prospect No. 99—No. 116 on Map II.

On the east side of Sam Ridge, 0.8 mile northwest of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3448′ L.

			Ft.	In.
Coal	3′	4″		
Slate	0	6	3	10

Gauley Coal Land Company Prospect No. 96—No. 117 on Map II.

On the west bank of Elijah Branch, 1.5 miles northwest of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3490′ L.

			Ft.	In.
Coal			3	2

Gauley Coal Land Company Prospect No. 95—No. 118 on Map II.

On the west bank of Elijah Branch, 1.7 miles northwest of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3509′ L.

			Ft.	In.
Bone	1′	8″		
Coal	2	6	4	2

Gauley Coal Land Company Prospect No. 94—No. 119 on Map II.

On the west bank of Elijah Branch, 1.8 miles northwest of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3504′ L.

			Ft.	In.
Bone	1′	8″		
Coal	2	6	4	2

Gauley Coal Land Company Prospect No. 92—No. 120 on Map II.

On the east bank of Elijah Branch, 1.9 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation 3483′ L.

	Ft.	In.
Coal	3	0

Gauley Coal Land Company Prospect No. 91—No. 121 on Map II.

On the east bank of Elijah Branch, 1.7 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3485′ L.

	Ft.	In.
Coal	3	1

Gauley Coal Land Company Prospect No. 90—No. 122 on Map II.

On the east bank of Elijah Branch, 1.5 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3468′ L.

	Ft.	In.
Coal	3	3

Gauley Coal Land Company Prospect No. 89—No. 123 on Map II.

On the east bank of Elijah Branch, 1.3 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3475′ L.

	Ft.	In.
Coal	2	7

Gauley Coal Land Company Prospect No. 88A—No. 124 on Map II.

On the west bank of Road Branch, 1.2 miles north of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3450′ L.

			Ft.	In.
Coal	3′	4″		
Bone	1	2		
Coal	1	2		
Bone	0	3	5	11

Gauley Coal Land Company Prospect No. 88— No. 125 on Map II.

On the west bank of Road Branch, 1.7 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3476′ L.

			Ft.	In.
Coal	3′	2″		
Bone	0	9		
Coal and bone, interlaminated	1	3	5	2

Gauley Coal Land Company Prospect No. 87— No. 126 on Map II.

On the west bank of Road Branch, 2 miles north of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3507′ L.

	Ft.	In.
Coal	2	6

Gauley Coal Land Company Prospect No. 86— No. 127 on Map II.

On the east bank of Road Branch, 1.5 miles north of Duo; Gauley Coal Land Coal Company authority for this section; Sewell Coal; elevation, 3491′ L.

			Ft.	In.
Coal and bone, interlaminated	1′	0″		
Coal	3	7	4	7

Gauley Coal Land Company Prospect No. 84— No. 128 on Map II.

On the east bank of Road Branch, 1.9 miles southwest of Clearco and 1.25 miles north of Duo; Gauley Coal Land Company authority this section; Sewell Coal; elevation, 3470′ L.

			Ft.	In.
Bone	1′	2½″		
Coal	0	6		
Bone	0	0½		
Coal	2	3½	4	0½

Gauley Coal Land Company Prospect No. 83C— No. 129 on Map II.

On the north bank of North Fork of Big Clear Creek, 1.8 miles west of Clearco and 1.4 miles north of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3495′ L.

			Ft.	In.
Bone	0′	7″		
Coal	2	7		
Slate	0	2½		
Coal	0	3½	3	8

Gauley Coal Land Company Prospect No. 83B—No. 130 on Map II.

On the south side of Beech Ridge, 1.7 miles northwest of Clearco and 2.1 miles north of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**, elevation, 3542′ L.

	Ft.	In.
Coal	2	7

Gauley Coal Land Company Prospect No. 83A—No. 131 on Map II.

On the south side of Beech Ridge, 1.6 miles northwest of Clearco and 2.2 miles north of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3552′ L.

	Ft.	In.
Coal	3	7

Gauley Coal Land Company Prospect No. 83—No. 132 on Map II.

On the south side of Beech Ridge, 1.5 miles southwest of Clearco and 1.3 miles northeast of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3467′ L.

			Ft.	In.
Coal	0′	5″		
Slate	0	0½		
Coal	3	1		
Coal and bone, interlaminated	0	3	3	9½

Gauley Coal Land Company Prospect No. 82—No. 133 on Map II.

On the south side of Beech Ridge, 1 mile northwest of Clearco and 2.1 miles northeast of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation 3496′ L.

			Ft.	In.
Coal and bone, interlaminated	0′	8″		
Coal	2	6		
Slate	0	1		
Coal	1	0		
Slate	0	4		
Coal	0	2	4	9

Gauley Coal Land Company Prospect No. 81—No. 134 on Map II.

On the south side of Beech Ridge, 0.85 mile northwest of Clearco; and 2.1 miles northeast of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3497′ L.

			Ft.	In.
Coal	0′	8″		
Slate	0	7		
Coal	3	0		
Slate	0	7		
Coal	0	11		
Slate	0	4		
Coal	1	3		
Slate	0	3	7	7

Gauley Coal Land Company Prospect No. 80—No. 135 on Map II.

On the south side of Beech Ridge, 0.8 mile west of Clearco and 2 miles northeast of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3497′ L.

			Ft.	In.
Coal	4′	4″		
Slate	0	7		
Coal	0	4	5	3

Gauley Coal Land Company Prospect No. 79—No. 136 on Map II.

On the south side of Beech Ridge, 0.8 mile southwest of Clearco and 1.9 miles northeast of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3513′ L.

			Ft.	In.
Coal and bone, interlaminated..	1′	5″		
Coal	3	5	4	10

Gauley Coal Land Company Prospect No. 78—No. 137 on Map II.

On the south side of Beech Ridge, 0.8 mile southwest from Clearco and 1.75 miles northeast of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3519′ L.

			Ft.	In.
Coal and bone, interlaminated....	1′	5″		
Coal	2	11	4	4

Gauley Coal Land Company Prospect No. 77—No. 138 on Map II.

On the south side of Beech Ridge, 0.5 mile west of Clearco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3518′ L.

			Ft.	In.
Coal	3′	9″		
Slate	1	5		
Coal	0	11	6	1

Gauley Coal Land Company Prospect No. 76—No. 139 on Map II.

On the south side of Beech Ridge, 0.4 mile west of Clearco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3503′ L.

			Ft.	In.
Coal	3′	8″		
Slate	1	1		
Coal	1	4	6	1

Gauley Coal Land Company Prospect No. 75—No. 140 on Map II.

On the south side of Beech Ridge, 0.4 mile northeast of Clearco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3526′ L.

			Ft.	In.
Coal	0′	5″		
Slate	0	0½		
Coal	3	8	4	1½

Gauley Coal Land Company Prospect No. 74—No. 141 on Map II.

On the south side of Beech Ridge, 0.2 mile northwest of Clearco; **Sewell Coal**; elevation, 3526′ L.

			Ft.	In.
Shale, dark, sandy			15	0
Coal, bony	1′	0″		
Coal, clean	0	5		
Slate, 0′ 1″ to	0	2		
Coal, columnar	3	0		
Slate and shale	1	1		
Coal, clean (slate floor)	1	2	6	10

Clear Creek Coal Company "Brooke" Mine No. 2—No. 142 on Map II.

On the south side of Beech Ridge, 0.3 mile northeast of Clearco; section as shown on mine map; **Sewell Coal**; elevation, 3554′ L.

Location of section: on 1st left, 500′ from main entry

			Ft.	In.
Bone	1′	3″		
Coal	3	8		
Slate	1	2		
Coal	1	3	7	4

Mine post-office address and shipping point, Clearco; mine superintendent, R. J. Holmes; on Nicholas, Fayette, and Greenbrier Railroad.

Clear Creek Coal Company "Brooke" Mine No. 1—No. 143 on Map II.

On the south side of Beech Ridge, 0.3 mile northeast of Clearco; **Sewell Coal**; elevation, 3567′ L.

Section measured at the face of main entry, 350′ (east-northeast) from mine mouth.

			Ft.	In.
1. Coal, very hard (slate roof)	0′	3″		
2. Bone	0	1		
3. Coal, good, columnar	3	0		
4. Bone	0	4		
5. Coal, laminated (slate floor)	1	1	4	9

A sample (No. 97PH) was taken from Nos. 1, 2, 3, and 5 of the above section and its analysis is published under **No. 143** in the Table of Coal Analyses at the end of this Chapter.

Previous to the opening of the mine two samples were taken from a prospect opening at the same locality. The section is as follows:

			Ft.	In.
1. Coal, columnar (dark shale roof)	3′	8″		
2. Slate	1	1		
3. Coal, hard (slate floor)	1	1	5	10

Sample No. 78A-PH was taken from No. 1 and sample No. 78B-PH was taken from No. 3 of the above section and their analyses are published under **No. 143** in the Table of Coal Analyses at the end of this Chapter. These samples show a lower volatile and higher ash content than the one taken inside the mine. As indicated by the above sections the parting thins rapidly to the east.

Clear Creek Coal Company Prospect—No. 144 on Map II.

On the south side of Beech Ridge, 0.4 mile east of Clearco; **Sewell Coal**; elevation, 3565′ B.

			Ft.	In.
Coal, columnar (shale roof)	3′	9″		
Shale and slate	1	1		
Coal, hard (slate floor)	1	1	5	11

Gauley Coal Land Company Prospect No. 72—No. 145 on Map II.

On the south side of Beech Ridge, 0.6 mile east of Clearco; **Sewell Coal**; elevation, 3567′ L.

			Ft.	In.
Coal (shale roof, dark, sandy)	0′	3″		
Slate	0	2		
Coal, columnar	2	4		
Slate	0	4		
Coal (slate floor)	1	10	4	11

Gauley Coal Land Company Prospect No. 71—No. 146 on Map II.

1.1 miles northwest of Job Knob and 0.6 mile southeast of Clearco; **Sewell Coal**; elevation, 3578′ L.

			Ft.	In.
Shale, dark			5	0
Coal	0′	2″		
Slate	0	3½		
Coal, columnar	2	10		
Slate	1	2		
Coal (slate floor)	1	1	5	6½

Gauley Coal Land Company Prospect No. 70—No. 147 on Map II.

1.2 miles northwest of Job Knob and 0.4 mile southeast of Clearco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3603′ L.

			Ft.	In.
Coal	2′	0″		
Bone	0	1		
Coal	1	6		
Coal and bone, interlaminated	0	1	3	8

Gauley Coal Land Company Prospect No. 69—No. 148 on Map II.

0.7 mile northwest of Job Knob and 1 mile southeast of Clearco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3640′ L.

			Ft.	In.
Coal			3	$5\frac{1}{2}$

Raine Lumber and Coal Company Prospect—No. 149 on Map II.

On the east side of Big Clear Creek, 0.5 mile north of Duo; **Sewell Coal**; elevation, 3431′ L.

			Ft.	In.
Shale, dark, weathers brown, concretions			8	0
Shale, black, slaty, small pelecypods			0	7
Coal some bone	0′	8″		
Coal, columnar	2	2		
Coal, hard, blocky (shale floor)	0	7	3	5

Coal Prospect—No. 150 on Map II.

On the property of the Raine Lumber and Coal Company, behind the "Old House" at Duo; **Sewell Coal**; elevation, 3422′ L.

	Ft.	In.
Shale, dark, **Hartridge**		
Coal, clean (slate floor)	3	4

A sample (No. 79PH) was taken from the above section and its composition is published under **No. 150** in the Table of Coal Analyses at the end of this Chapter.

Raine Lumber and Coal Company "Duo" Mine—No. 151 on Map II.

On the west side of Shellcamp Ridge, 0.5 mile southeast of Duo; **Sewell Coal**; elevation, 3485′ L.

			Ft.	In.
Coal, hard (black slate roof)	0′	5″		
Coal, blocky, laminated	0	7		
Coal, columnar	0	7		
Coal, soft, columnar	1	6		
Coal, hard (slate floor)	0	8	3	9

The above section was measured at a prospect opening before the mine was opened. The prospect was at the same location as that of the mine and was driven in from the outcrop 50 feet.

A sample (No. 153PII) was taken from the above section and its analysis is given under **No. 151** in the Table of Coal Analyses at the end of this Chapter.

Post-office address and shipping point, Duo; superintendent, J. W. Raine; on Nicholas, Fayette, and Greenbrier Railroad.

Raine Lumber and Coal Company Coal Stripping— No. 152 on Map II.

On the west side of Shellcamp Ridge, 1.3 miles south of Duo; **Sewell Coal**; elevation, 3567′ L.

			Ft.	In.
Coal, bony (black shale roof)	0′	9½″		
Coal, blocky	0	7		
Coal, columnar	1	6		
Coal, hard, blocky	0	4		
Bone	0	0½		
Coal (shale floor)	0	2	3	5

A sample (No. 152PII) was taken from the above section and its composition is published under **No. 152** in the Table of Coal Analyses at the end of this Chapter.

Raine Lumber and Coal Company Coal Stripping— No. 153 on Map II.

On Shellcamp Ridge, 1.5 miles south of Duo; **Sewell Coal**; elevation, 3600′ B.

	Ft.	In.
Coal (small boulder in top), 3′ to	4	0

Raine Lumber and Coal Company Prospect— No. 154 on Map II.

On the west side of Smokehouse Branch, 0.9 mile southeast of Duo; **Sewell Coal**; elevation, 3574′ L.

			Ft.	In.
1. Shale, with **coal** streaks	0′	10″		
2. **Coal**, draw	0	3		
3. **Coal**, blocky and laminated	1	3		
4. **Coal**, columnar	1	3		
5. **Coal**, blocky, hard, laminated	0	3		
6. **Coal**, hard, some bone (slate floor)	0	8	4	6

A sample (No. 154PII) was taken from Nos. 2, 3, 4, 5, and 6 of the above section and its analysis is published under

No. 154 in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. 23—No. 155 on Map II.

On the east side of Smokehouse Ridge, 2.1 miles east of Duo and 5.35 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3816′ L.

	Ft.	In.
Coal (slate roof and floor)	3	3

Raine Lumber and Coal Company Prospect—No. 156 on Map II.

On the waters of Oldhouse Branch, 2.3 miles east of Duo and 0.9 mile west of Job Knob; **Sewell Coal**; elevation, 3752′ L.

	Ft.	In.
Coal, thickness reported by Joe Raine as	3	8

Lemuel Hellems Mine—No. 157 on Map II.

Farm mine, on the west side of Peaser Ridge, 0.15 mile south of Hellem School; authority, David B. Reger (No. 1239, Nicholas Report, pages 707-8); **Sewell Coal**; elevation, 2770′ B.

			Ft.	In.
1. **Coal**, soft (dark slate roof)	4′	7″		
2. Slate, dark	0	6		
3. **Coal**, soft (shale floor)	1	4	6	5

A sample (No. 352R) was taken from Nos. 1 and 3 of the above section and its analysis is published under **No. 157** in the Table of Coal Analyses at the end of this Chapter.

Lemuel Hellems Mine—No. 158 on Map II.

Farm mine, on the west side of Peaser Ridge, 0.1 mile northwest of Hellem School; authority David B. Reger (No. 1238, Nicholas Report, page 707); **Sewell Coal**; elevation, 2725′ B.

			Ft.	In.
Coal, soft (dark shale roof)	3′	6″		
Shale, dark	0	6		
Coal, bony	0	5		
Coal, soft (fire clay floor)	1	4	5	9

Gauley Coal Land Company Prospect—No. 159 on Map II.

On the west side of Peaser Branch, 2.8 miles northwest of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2730′ B.

	Ft.	In.
Coal	5	2

Gauley Coal Land Company Prospect—No. 160 on Map II.

On the west side of Peaser Branch, 2.6 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2780′ B.

	Ft.	In.
Coal	4	1

Gauley Coal Land Company Prospect No. 379—No. 161 on Map II.

On the west side of Peaser Branch, 2.3 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2815′ B.

	Ft.	In.
Coal	4	7

Gauley Coal Land Company Prospect No. 383—No. 162 on Map II.

On the west side of Peaser Branch, 2.2 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2859′ B.

	Ft.	In.
Coal	5	2

Gauley Coal Land Company Prospect No. 384—No. 163 on Map II.

On the west side of Peaser Branch, 1.45 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2962′ B.

	Ft.	In.
Coal	6	0

Gauley Coal Land Company Prospect No. 385—No. 164 on Map II.

On the west side of Peaser Branch, 1.55 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2960′ B.

	Ft.	In.
Coal	6	6

Gauley Coal Land Company Prospect No. 386—No. 165 on Map II.

On the west side of Peaser Branch, 1.5 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3021′ B.

	Ft.	In.
Coal	4	10

Gauley Coal Land Company Prospect No. 387—No. 166 on Map II.

On the west side of Peaser Branch, 1.7 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3112' B.

			Ft.	In.
Coal	1'	1"		
Slate band	....	....		
Coal	3	9	4	10

Gauley Coal Land Company Prospect No. 388—No. 167 on Map II.

On the west side of the head of Peaser Branch, 1.8 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3170' B.

			Ft.	In.
Coal	1'	2"		
Slate	0	4		
Coal	3	10	5	4

Gauley Coal Land Company Prospect No. 389—No. 168 on Map II.

On the head of Peaser Branch, 1.9 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3202' B.

	Ft.	In.
Coal	5	1

Gauley Coal Land Company Prospect No. 392—No. 169 on Map II.

On the head of Peaser Branch, 2 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3245' B.

			Ft.	In.
Coal	1'	4"		
Slate	1	0		
Coal	2	10	5	2

Gauley Coal Land Company Prospect No. 394—No. 170 on Map II.

On the head of Peaser Branch, 2.4 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3213' B.

			Ft.	In.
Coal	1'	3"		
Slate	0	1½		
Coal	2	10	4	2½

Gauley Coal Land Company Prospect No. 396—No. 171 on Map II.

On the west side of Little Trap Ridge, 2 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3060′ B.

	Ft.	In.
Coal	3	11

Gauley Coal Land Company Prospect No. 397—No. 172 on Map II.

On the north end of Little Trap Ridge, 2.9 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2831′ B.

	Ft.	In.
Coal	2	2

Gauley Coal Land Company Prospect—No. 173 on Map II.

On the north side of Hominy Creek, 3.6 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2821′ B.

	Ft.	In.
Coal	5	5

Gauley Coal Land Company Prospect No. 398—No. 174 on Map II.

On the east side of Little Trap Ridge, 2.7 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 2932′ B.

	Ft.	In.
Coal	5	7½

Gauley Coal Land Company Prospect No. 399—No. 175 on Map II.

On the east side of Little Trap Ridge, 2.5 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3060′ B.

	Ft.	In.
Coal	3	11

Gauley Coal Land Company Prospect No. 401—No. 176 on Map II.

On the northwest side of Big Clear Creek Mountain, 2.8 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3208′ B.

			Ft.	In.
Coal	1′	6″		
Slate	0	1		
Coal	2	6	4	1

Gauley Coal Land Company Prospect No. 402—No. 177 on Map II.

On the northwest side of Big Clear Creek Mountain, 3 miles northeast of Quinwood; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3234′ B.

			Ft.	In.
Coal	1′	4″		
Slate	6	0		
Coal	2	10	10	2

Gauley Coal Land Company Prospect No. 404—No. 178 on Map II.

On the northwest side of Big Clear Creek Mountain, 3.2 miles northwest of Duo and 3 miles northeast of Marfrance; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3234′ L.

	Ft.	In.
Coal	2	10

Gauley Coal Land Company Prospect No. 405—No. 179 on Map II.

On the headwaters of Hominy Creek, 3.2 miles northwest of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3191′ L.

	Ft.	In.
Coal	2	10

Gauley Coal Land Company Prospect No. 406—No. 180 on Map II.

On the headwaters of Hominy Creek, 3.1 miles northwest of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3212′ L.

	Ft.	In.
Coal	3	6

Gauley Coal Land Company Prospect No. 407—No. 181 on Map II.

On the headwaters of Hominy Creek, 2.6 miles northwest of Duo; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3313′ L.

	Ft.	In.
Coal	5	6

Gauley Coal Land Company Prospect No. 407A—No. 182 on Map II.

On the headwaters of Hominy Creek, 2.5 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3424′ L.

	Ft.	In.
Coal	2	6

Gauley Coal Land Company Prospect No. 409—No. 183 on Map II.

On the south side of Blue Ridge, 2.7 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3377′ L.

	Ft.	In.
Coal	3	2

Gauley Coal Land Company Prospect No. 410—No. 184 on Map II.

On the west side of Blue Ridge, 2.3 miles northwest of Duo; Gauley Coal Land Company authority for this section; Sewell Coal, elevation, 3210′ L.

	Ft.	In.
Coal	3	1

Gauley Coal Land Company Prospect No. 412—No. 185 on Map II.

On the north side of Blue Ridge, 2.3 miles southwest of Beech Knob; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3259′ L.

	Ft.	In.
Coal	2	5

Gauley Coal Land Company Prospect No. 413—No. 186 on Map II.

On the north side of Blue Ridge, 1.65 miles southwest of Beech Knob; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3362′ L.

	Ft.	In.
Coal	2	1

Perry Amick Mine—No. 187 on Map II.

Farm mine, 1.75 miles southwest of Lile and 1 mile southeast of White Buck School; authority, David B. Reger (No. 1217, Nicholas Report, page 702); Sewell Coal; elevation, 3120′ B.

	Ft.	In.
Coal (slate roof and floor)	3	2

Gauley Coal Land Company Prospect No. 416—No. 188 on Map II.

1.4 miles southwest of Lile and 1.15 miles southeast of White Buck School, Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3232′ L.

			Ft.	In.
Coal	1′	2″		
Slate	0	10		
Coal	3	4	5	4

Gauley Coal Land Company Prospect No. 418—No. 189 on Map II.

1.3 miles southwest of Lile and 1 mile southeast of White Buck School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3215′ L.

			Ft.	In.
Coal	1′	4″		
Slate	1	2		
Coal	2	11	5	5

Gauley Coal Land Company Prospect No. 419—No. 190 on Map II.

1.1 miles southwest of Lile and 1.2 miles southeast of White Buck School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3245′ L.

			Ft.	In.
Coal	2′	4½″		
Slate	1	5		
Coal	2	5	6	2½

Gauley Coal Land Company Prospect No. 420—No. 191 on Map II.

0.85 mile west of Lile and 1.3 miles southeast of White Buck School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3215′ L.

			Ft.	In.
Laminated	0′	10″		
Coal	2	6	3	4

Gauley Coal Land Company Prospect No. 422—No. 192 on Map II.

On the headwaters of Brushy Meadow Creek, 1.25 miles northwest of Lile and 0.85 mile east of White Buck School; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3066′ L.

	Ft.	In.
Coal	3	11

Gauley Coal Land Company Prospect No. 423—No. 193 on Map II.

On the headwaters of Brushy Meadow Creek, 1.2 miles northwest of Lile and 0.95 mile east of White Buck School; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3096′ L.

			Ft.	In.
Coal	1′	2″		
Slate	0	1		
Coal	2	9	4	0

Gauley Coal Land Company Prospect No. 424—No. 194 on Map II.

On the headwaters of Brushy Meadow Creek, 0.9 mile northwest of Lile; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3137′ L.

			Ft.	In.
Coal	1′	3″		
Slate	0	8		
Coal	2	6½	4	5½

Gauley Coal Land Company Prospect No. 425—No. 195 on Map II.

On the headwaters of Brushy Meadow Creek, 0.6 mile northwest of Lile; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3223′ L.

	Ft.	In.
Coal	3	7

Sewell Coal, Williamsburg District.

Of the estimated 22,693,016 tons of Sewell Coal in Williamsburg District, about 95 per cent. is on Beech Ridge. The other 5 per cent. is accounted for by small isolated areas of coal on or near Manning Knob and small areas on Kerless and Sugar Knobs. The following openings and prospects were noted:

Marshall Amick Mine (Abandoned)—No. 196 on Map II.

Farm mine, on the head of Pack Fork of Laurel Creek, 3.9 miles south 69° east of Leivasy and 1 mile northeast of Lile; authority, David B. Reger (No. 1184, Nicholas Report, page 694); Sewell Coal; elevation, 3070′ B.

	Ft.	In.
Shale, sandy	10	0
Coal, soft (slate floor)	2	5

Levi Lilly Mine (Abandoned)—No. 197 on Map II.

Farm mine, on the north bank of McMillion Creek, 1.7 miles northeast of Lile and 4.6 miles south 80° east of Leivasy; authority, David B. Reger (No. 1183, Nicholas Report, page 693); **Sewell Coal**; elevation, 3155′ B.

	Ft.	In.
Slate, dark	....	....
Coal, soft, columnar	2	6
Shale, gray, with plant roots	....	....

Gauley Coal Land Company Prospect No. 31—No. 198 on Map II.

On southeast side of McMillion Creek, 0.2 mile east of Lile; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3317′ L.

	Ft.	In.
Coal	3	1

Gauley Coal Land Company Prospect No. 32—No. 199 on Map II.

On the headwaters of Beech Run, 0.9 mile east of Lile and 0.85 mile north of Beech Knob; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3426′ L.

	Ft.	In.
Coal	2	5

Gauley Coal Land Company Prospect No. 33—No. 200 on Map II.

1.25 miles northeast of Lile and 1.2 miles northeast of Beech Knob; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3417′ L.

	Ft.	In.
Coal	2	10

Gauley Coal Land Company Prospect No. 34—No. 201 on Map II.

1.45 miles northeast of Lile and 1.2 miles northeast of Beech Knob; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3496′ L.

	Ft.	In.
Coal	3	0

Gauley Coal Land Company Prospect No. 35—No. 202 on Map II.

On the headwaters of Hogcamp Run, 0.55 mile east of Little Beech Knob; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3621′ L.

	Ft.	In.
Coal	3	8

Gauley Coal Land Company Prospect No. 36—No. 203 on Map II.

On the north side of Beech Ridge, 1.9 miles east of Beech Knob; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3525′ L.

			Ft.	In.
Coal			4	1

Gauley Coal Land Company Prospect No. 36A—No. 204 on Map II.

On north side of Beech Ridge, 2 miles east of Beech Knob; Gauley Coal Land Coal Company authority for this section; **Sewell Coal**; elevation, 3521′ L.

			Ft.	In.
Coal			4	10

Gauley Coal Land Company Prospect No. 37—No. 205 on Map II.

On the north side of Beech Ridge, 2.1 miles east of Beech Knob; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3513′ L.

			Ft.	In.
Coal	0′	2½″		
Clay	0	0½		
Coal	5	0	5	3

Gauley Coal Land Company Prospect No. 38—No. 206 on Map II.

On the north side of Beech Ridge, 2.45 miles east of Beech Knob; Gauley Coal Land Company authority for this section; **Sewell Coal**; **elevation, 3527′ L.**

			Ft.	In.
Coal	2′	5″		
Slate	0	1		
Coal	1	3		
Bone	0	1	3	10

Gauley Coal Land Company Prospect No. 39—No. 207 on Map II.

On the north side of Beech Ridge, 1.3 miles northeast of Clearco; Gauley Coal Land Company authority for this section; **Sewell Coal**; elevation, 3545′ L.

			Ft.	In.
Bone	0′	6″		
Coal	3	8		
Laminated	0	2½		
Coal	0	8		
Bone	0	1		
Coal	0	8		
Bone	0	2	5	11½

Gauley Coal Land Company Prospect No. 39A—No. 208 on Map II.

On the northeast side of Beech Ridge, 1.25 miles east of Clearco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3602′ L.

	Ft.	In.
Coal	4	5

Gauley Coal Land Company Prospect No. 39B—No. 209 on Map II.

On the northeast side of Beech Ridge, 1.3 miles east of Clearco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3622′ L.

	Ft.	In.
Coal	4	2

Gauley Coal Land Company Prospect No. 40—No. 210 on Map II.

On the northeast side of Beech Ridge, 1.4 miles east of Clearco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3656′ L.

	Ft.	In.
Coal	4	2

Gauley Coal Land Company Prospect No. 40A—No. 211 on Map II.

On the northeast side of Beech Ridge, 1.5 miles east of Clearco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3656′ L.

	Ft.	In.
Coal	4	2½

Gauley Coal Land Company Prospect—No. 212 on Map II.

0.7 mile northeast of Job Knob and 1.7 miles southeast of Clearco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3733′ L.

	Ft.	In.
Coal	2	9

Gauley Coal Land Company Prospect—No. 213 on Map II.

0.6 mile northeast of Job Knob and 1.7 miles southeast of Clearco; Gauley Coal Land Company authority for this section; Sewell Coal; elevation, 3753′ L.

	Ft.	In.
Coal	3	0

Raine Coal and Land Company Prospect—No. 214 on Map II.

0.9 mile northeast of Job Knob and 2.2 miles southeast of Clearco; Sewell Coal; elevation, 3809′ L.

			Ft.	In.
1. Coal	3′	0″		
2. Coal (reported by J. W. Raine)	1	5	4	5

A sample (No. 155PH) was taken from No. 1 of the above section, and its composition is published under **No. 214** in the Table of Coal Analyses at the end of this Chapter.

Raine Lumber and Coal Company Mine (Abandoned)—No. 215 on Map II.

On the north side of Beech Ridge, 2.7 miles southeast of Clearco and 4.5 miles east of Duo; section measured 50 feet in from mine mouth; Sewell Coal; elevation, 3946′ L.

			Ft.	In.
Shale roof				
Coal, blocky, some bone at top	1′	0″		
Coal, columnar	1	6		
Coal, hard, laminated	1	0		
Coal, hard, bony at base	0	11	4	5

A sample (No. 156PH) was taken from the above section and its analysis is published under **No. 215** in the Table of Coal Analyses at the end of this Chapter.

Raine Lumber and Coal Company Prospect—No. 216 on Map II.

On the north side of Beech Ridge, 3.1 miles southeast of Clearco, and 4.75 miles east of Duo; Sewell Coal; elevation, 4013′ L.

	Ft.	In.
Coal, (reported by J. W. Raine), 3′ to	4	0

Coal Blossom—No. 217 on Map II.

On the Jetsville-Manning Knob road, 4 miles northeast of Clearco and 1.7 miles west of Manning Knob; Sewell Coal; elevation, 3665′ B.

	Ft.	In.
Coal, exposed	1	6

Gauley Coal Land Company (?) Prospect— No. 218 on Map II.

5.3 miles northeast of Lile and 1.6 miles west of Manning Knob; **Sewell Coal**; elevation, 3620′ B.

	Ft.	In.
Coal, reported	3	4

Gauley Coal Land Company (?) Prospect— No. 219 on Map II.

On the Jetsville-Manning Knob road, 5.3 miles northeast of Lile and 1.5 miles northwest of Manning Knob; **Sewell Coal**; elevation, 3660′ B.

	Ft.	In.
Coal, reported	3	4

Gauley Coal Land Company (?) Mine (Abandoned)— No. 220 on Map II.

On the Jetsville-Manning Knob road, 5.7 miles northeast of Lile and 1.4 miles northwest of Manning Knob; **Sewell Coal**; elevation, 3700′ B.

	Ft.	In.
Coal, reported	2	2

Coal Prospect—No. 221 on Map II.

On the east side of Manning Knob, on the west side of the Cold Knob road; **Sewell Coal**; elevation, 3870′ B.

	Ft.	In.
Coal, reported by Sam Howard to be 1′ 6″ to	2	0

Coal Blossom—No. 221A on Map II.

On the east side of Manning Knob, on the west side of Cold Knob road; **Sewell Coal**; elevation, 3870′ B.

	Ft.	In.
Coal, thickness not determined	....	....

John A. Bailes Coal Stripping—No. 222 on Map II.

On south side of Nixon Branch of Laurel Creek, 2.8 miles S. 22° E. of Saxman; authority David B. Reger (No. 1182 Nicholas Report, page 693); **Sewell Coal**; elevation, 2995′ B.

	Ft.	In.
1. Slate, black		
2. **Coal**, soft	4	5
3. Slate, pavement		

A sample (No. 376R) was collected from No. 2 of section, the composition of which is published under **No. 222** in the Survey Table of Coal Analyses at the end of this Chapter.

Coal Blossom—No. 223 on Map II.

On private road at Greenbrier-Nicholas County line, 1.9 miles south of Richwood; Sewell Coal; elevation, 2990′ B.

	Ft.	In.
Coal, thickness not determined	....	....

Sewell Coal, Falling Springs District.

In Falling Springs District, only a small fraction of the 18.6 square miles believed to be underlain by Sewell Coal has been prospected. Six openings and prospects in the Sewell Coal were found and they are all in the immediate vicinity of the two abandoned mines of the Elk Lick Coal Company. The thickness of the coal in and around these mines varies from two feet to four feet and ten inches; however, due to the uncertainties involved, the low average thickness of two feet was used in computing the estimate of 41,483,059 tons of Sewell Coal present in Falling Springs District. It is believed that a large part of the 18.6 square miles is underlain by Sewell Coal with a thickness in excess of 3 feet and that the estimate is conservative.

Elk Lick Coal Company "Turkey Run" Mine (Abandoned)—No. 224 on Map II.

On the east side of Turkey Run of North Fork of Cherry River, 4.6 miles southeast of Richwood; Sewell Coal; elevation, 3370′ L.

	Ft.	In.
Coal	4	8

The coal production statistics given at the beginning of this Chapter include the production from this mine with the production of the following mine under the "Spruce Knob" mine.

Elk Lick Coal Company "Spruce Knob" Mine (Abandoned)—No. 225 on Map II.

On the south side of North Fork of Cherry River, 5 miles southeast of Richwood; Sewell Coal; elevation, 3379′ L.

			Ft.	In.
1. Shale, black, weathers red, thin and platy, fossil collection 149			5	0
2. Coal, laminated	1′	6½″		
3. Coal, columnar	1	1½		
4. Coal, laminated	0	7		
5. Coal, columnar	0	8		
6. Coal, laminated	0	7	4	6
7. Sandstone, shaly				

A sample (No. 163PH) was taken from Nos. 2, 3, 4, 5, and 6 of the above section and its analysis is published under **No. 225** in the Table of Coal Analyses at the end of this Chapter.

The following section and comment by Reger is reprinted from page 688 of the Nicholas County Report:

	Ft.	In.
1. Slate, dark		
2. Coal, soft, columnar	4	6
3. Slate, pavement		

"Principal office, Richwood, W. Va.; daily output, 100 tons; 15 miners and 9 laborers employed; mule haulage; greatest rise, southeast; coal used for railroad fuel by Cherry River Boom & Lumber Company; H. C. Livesay, Timekeeper, authority for mine data; sample (No. 211R) collected in First Left from No. 2 of section, for composition of which see (No. 225) in the Survey Table of Coal Analyses at the end of this Chapter."

As noted in the headings, mines Nos. 224 and 225 are now abandoned. Any correspondence concerning them should be addressed to the Cherry River Boom & Lumber Company, Richwood, W. Va.

Elk Lick Coal Company Prospect—No. 226 on Map II.

On the north side of Briery Run, 4.3 miles southeast of Richwood; Sewell Coal; elevation, 3400′ B.

	Ft.	In.
Coal thickness undetermined	....	....

Elk Lick Coal Company Prospect—No. 227 on Map II.

On the head of Beech Lick Run, 4.7 miles southeast of Richwood; authority, Elk Lick Coal Company's mine map; **Sewell Coal**; elevation, 3456′ L.

	Ft.	In.
Coal	4	0

Elk Lick Coal Company Prospect—No. 228 on Map II.

On the north side of Rocky Run, 5.5 miles southeast of Richwood; authority, Elk Lick Coal Company's mine map; **Sewell Coal**; elevation, 3570′ L.

	Ft.	In.
Coal	4	0

Elk Lick Coal Company Prospect—No. 229 on Map II.

On the waters of Rocky Run, on the south side of Bearwallow Knob, 6.1 miles southeast of Richwood; authority, Elk Lick Coal Company's mine map; **Sewell Coal**; elevation, 3670′ L.

	Ft.	In.
Coal	2	0

The following section is of a mine in Pocahontas County near the Greenbrier line. The section with comments by Paul H. Price is reprinted from page 297 of the Pocahontas County Report:

Preston Clark Heirs Prospect—No. 230 on Map II.

Pocahontas County, Little Levels District; on west side of Briery Knob, one-half mile northwest of triangulation station and Fire-Tower; **Sewell Coal**; elevation, 4225′ B.

			Ft.	In.
Shale, Hartridge; plants and pelecypods				
Coal, good, clean	2′	2″		
Shale, argillaceous	1	10		
Coal, clean	1	3		
Coal, bony	1	0	6	3
Concealed				

"It is doubtful if the complete thickness of the coal here is revealed by this section. Mr. Lee Clark, who had been in the mine, reported as much as eleven feet at certain points."

A sample (No. 62PH) of this coal was taken, the composition of which appears under **Mine No. 230** in the Table of Coal Analyses at the end of this Chapter.

Quantity of Sewell Coal Available.

The following table, calculated from planimetric measurement of the Sewell Coal outcrop on Map II, for the minable areas as indicated in Figure 17, shows the probable amount of Sewell Coal in Greenbrier County. The assumed average thicknesses of coal and the total tonnage are believed to be quite conservative:

Probable Amount of Sewell Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal (2000 Lbs.)
Meadow Bluff	2	13.20	8,448	735,989,760	29,439,590
Meadow Bluff	3	6.65	4,256	556,174,080	22,246,963
Meadow Bluff	3½	12.00	7,680	1,170,892,800	46,835,712
Meadow Bluff	4	2.00	1,280	223,027,200	8,921,088
Meadow Bluff	4½	8.80	5,632	1,103,984,640	44,159,385
Williamsburg	2½	2.30	1,472	160,300,800	6,412,032
Williamsburg	3	2.60	1,664	217,451,520	8,698,060
Williamsburg	3½	0.80	512	78,059,520	3,122,380
Williamsburg	4	1.00	640	111,513,600	4,460,544
Falling Springs	2	18.60	11,904	1,037,076,480	41,438,059
Totals	....	67.95	43,488	5,394,470,400	215,778,813

According to the records of the State Department of Mines, the total coal mined at operations in the Sewell Coal of Greenbrier County to the end of the calendar year 1936, is 22,382,111 short tons. Assuming a recovery factor of 80 per cent., the 215,778,813 tons above would be reduced to 172,623,050 short tons of Sewell Coal in Greenbrier County, from which should be deducted the amount already mined, leaving a recoverable tonnage on above basis of 150,240,939.

LITTLE RALEIGH COAL.

The Little Raleigh Coal, previously discussed in Chapter VI, pages 235-6, is generally persistent throughout a considerable part of Greenbrier County. In general it ranges in thickness from 2 to 3 feet but scattered sections show a thickness of 4 feet of clean coal. Chemical analyses indicate that the ash content is fairly high but it is probable that some of the openings sampled were not driven in far enough to reach the best coal. This coal has been mined at several points for local use but at present (1936) there are no actively operating mines in the area. In appearance and rank the Little Raleigh Coal is quite similar to the other Pottsville coals of the region.

Greenbrier County is the only county in the State in which the Little Raleigh Coal is known to be of minable thickness. Figure 19, page 531, shows the probable area of minable Little Raleigh Coal but its outcrop is not outlined on Map II. The position of the outcrop of this seam can be easily found by reference to the Sewell Coal structure contour lines since it is generally 130 to 160 feet below the Sewell horizon.

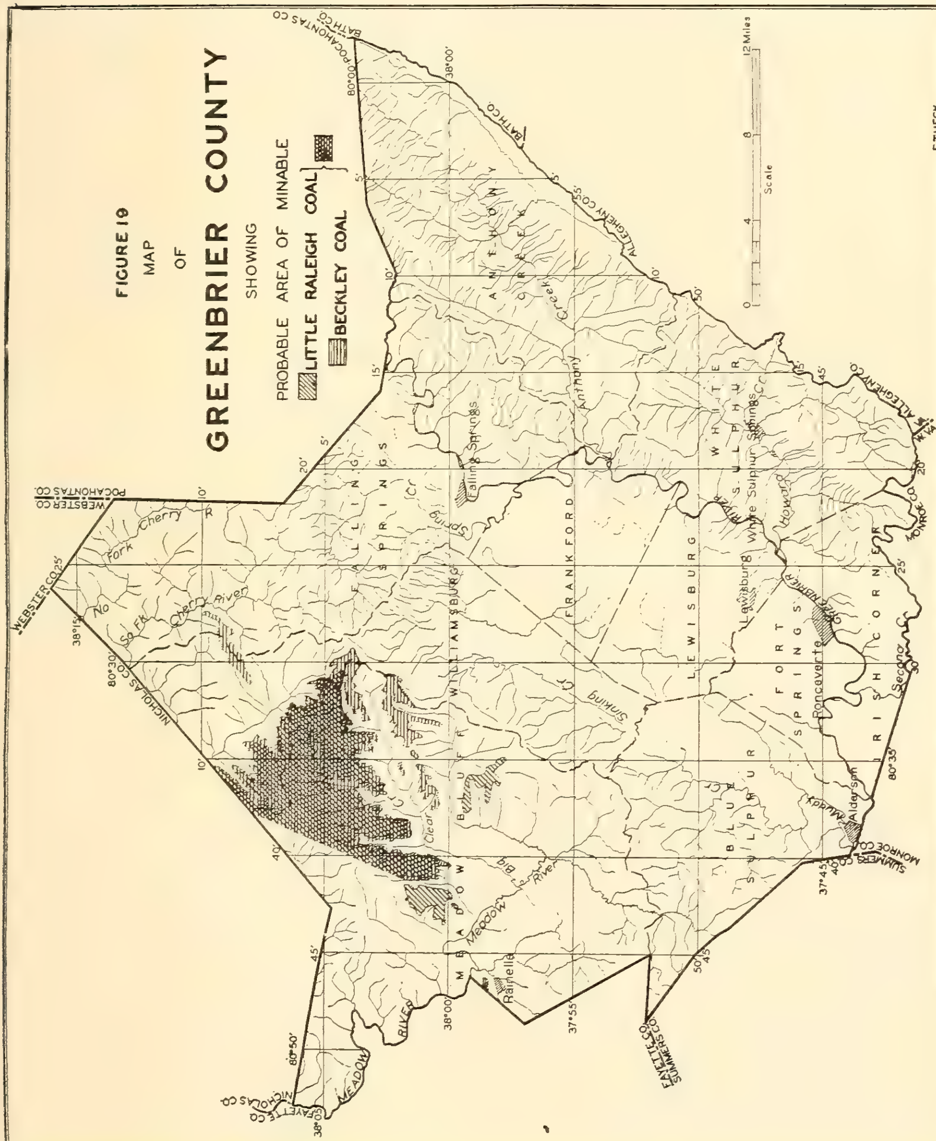


FIGURE 19
MAP
OF
GREENBRIER COUNTY
SHOWING
PROBABLE AREA OF MINABLE
LITTLE RALEIGH COAL
BECKLEY COAL
Scale
12 Miles
E.THECK
FALLING SPRINGS
WILLIAMSBURG
FRANKFORD
LEWISBURG
WHITE SULPHUR
ANTHONY CREEK
FORT SPRINGS
BLUE SULPHUR
IRISH CORNER
MEADOW BLUFF
Falling Springs
White Sulphur Springs
Lewisburg
Ronceverte
Rainelle
Alder Spr.
Anthony Creek
Sinking Cr.
Spring Cr.
Howard Cr.
Clear Cr.
Big Meadow River
Meadow River
Cherry River
No Fork Cherry R
So Fk
Second Cr.
Greenbrier River
POCAHONTAS CO.
WEBSTER CO.
NICHOLAS CO.
FAYETTE CO.
SUMMERS CO.
MONROE CO.
ALLEGHENY CO.
BATH CO.

Little Raleigh Coal, Meadow Bluff District.

In Meadow Bluff District the Little Raleigh Coal is noted in coal test borings Nos. 5, 5A, 5C, 5H, 5I, 5K, 5M, 6, and 11, the details of which are published on preceding pages. The prospects and openings noted are as follows:

Gauley Coal Land Company Prospect No. 8—No. 231 on Map II.

On west side of Mill Creek Mountain, 1.85 miles northeast of Charmco and 3.9 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3123′ L.

	Ft.	In.
Coal (slate roof and floor)	2	1

Coal Exposure No. 231A of the Little Raleigh Coal is published in the Charmco Section, page 164, where a thickness of one foot was noted at an elevation of 2925′ B.

Gauley Coal Land Company Prospect No. 7—No. 232 on Map II.

On Mill Creek Mountain, 1.95 miles northeast of Charmco and 3.35 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3193′ L.

	Ft.	In.
Coal (slate floor)	2	6

Gauley Coal Land Company Prospect No. 6—No. 233 on Map II.

On Mill Creek Mountain, 1.8 miles northeast of Charmco and 3.15 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3193′ L.

	Ft.	In.
Coal (slate floor)	2	6

Gauley Coal Land Company Prospect No. 5—No. 234 on Map II.

On Mill Creek Mountain, 1.05 miles east of Charmco; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3127.7′ L.

			Ft.	In.
Coal (slate roof)	2′	3½″		
Coal, bony (slate floor)	0	3	2	6½

Gauley Coal Land Company Prospect No. 4—No. 235 on Map II.

On Mill Creek Mountain, 1.8 miles east of Charmco and 3 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3213′ L.

	Ft.	In.
Coal (slate roof and floor)	2	7

The following is an analysis made by the Commercial Testing and Engineering Company, of Charleston, W. Va., of a sample collected from above prospect by the Gauley Coal Land Company, as reported under Laboratory No. 86186 by the latter company:

	As Received. Per cent.	Dry Basis. Per cent.
Moisture	1.40	....
Volatile Matter	24.04	24.38
Fixed Carbon	66.70	67.65
Ash	7.86	7.97
	100.00	100.00
Sulphur	1.68	1.78
B. T. U.	14,093	14,293

Leslie Hines Mine (Abandoned)—No. 236 on Map II.

Gauley Coal Land Company Prospect No. 9, on Mill Creek Mountain, 1.7 miles east of Charmco and 2.75 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3218′ L.

	Ft.	In.
Coal	3	2

The following is an analysis made by the Commercial Testing and Engineering Company, of Charleston, W. Va., of a sample collected from the above opening by the Gauley Coal Land Company, as reported under Laboratory No. 86187 by the latter company:

	As Received. Per cent.	Dry Basis. Per cent.
Moisture	1.51	....
Volatile Matter	22.09	22.43
Fixed Carbon	67.21	68.24
Ash	9.19	9.33
	100.00	100.00
Sulphur	1.39	1.41
B. T. U.	13,830	14,042

Gauley Coal Land Company Prospect No. 11—No. 237 on Map II.

On south end of Mill Creek Mountain, 1.6 miles east of Charmco and 2.65 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3182′ L.

	Ft.	In.
Coal	3	0

Gauley Coal Land Company Prospect No. 10—No. 238 on Map II.

On Mill Creek Mountain, 1.75 miles east of Charmco and 2.6 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3232′ L.

	Ft.	In.
Coal (slate roof and floor)	3	2

Gauley Coal Land Company Prospect No. 3—No. 239 on Map II.

On east side of Mill Creek Mountain, 0.65 mile south of Big Branch School; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3218′ L.

	Ft.	In.
Coal (slate roof and floor)	2	10

Gauley Coal Land Company Prospect No. 2—No. 240 on Map II.

On east side of Mill Creek Mountain, 0.25 mile southeast of Big Branch School; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3193′ L.

	Ft.	In.
Coal (slate roof and floor)	2	8

The following is an analysis made by the Commercial Testing and Engineering Company, of Charleston, W. Va., of a sample collected from the above opening by the Gauley Coal Land Company, as reported under Laboratory No. 86185 by the latter company:

	As Received. Per cent.	Dry Basis. Per cent.
Moisture	3.09	....
Volatile Matter	22.83	23.56
Fixed Carbon	63.98	66.02
Ash	10.10	10.42
	100.00	100.00
Sulphur	1.32	1.36
B. T. U.	12,948	13,361

Gauley Coal Land Company Prospect No. 1— No. 241 on Map II.

On east side of Mill Creek Mountain, 0.2 mile northeast of Big Branch School; Gauley Coal Land Company authority for this section; Little Raleigh Coal; elevation, 3174′ L.

	Ft.	In.
Coal (slate roof and floor)	2	1

Gauley Coal Land Company Prospect No. 504— No. 242 on Map II.

On the north bank of North Fork of Big Clear Creek, 2 miles southwest of Clearco and 1.1 miles north of Duo; Gauley Coal Land Company authority for this section; Little Raleigh Coal; elevation, 3290′ L.

	Ft.	In.
Coal	2	10

Gauley Coal Land Company Prospect No. 503— No. 243 on Map II.

On the south side of Beech Ridge, 1.7 miles southwest of Clearco; and 1.3 miles north of Duo; Gauley Coal Land Company authority for this section; Little Raleigh Coal; elevation, 3282′ L.

			Ft.	In.
Coal	1′	3″		
Slate	0	2		
Coal	1	7	3	0

Gauley Coal Land Company Prospect No. 502— No. 244 on Map II.

0.9 mile northwest of Job Knob and 0.8 mile southeast of Clearco; Gauley Coal Land Company authority for this section; Little Raleigh Coal; elevation, 3510′ L(?).

	Ft.	In.
Coal	3	6

Gauley Coal Land Company Prospect No. 6— No. 245 on Map II.

On the east side of Smokehouse Branch, 1.85 miles northeast of its mouth and 1.5 miles southeast of Duo; Gauley Coal Land Company authority for this section; Little Raleigh Coal; elevation, 3555′ L.

			Ft.	In.
Coal	1′	2″		
Coal and slate (slate floor)	1	8½	2	10½

Gauley Coal Land Company Prospect No. 5— No. 246 on Map II.

On the east side of Smokehouse Branch, 1.5 miles northeast of its mouth and 1.7 miles southeast of Duo; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3637′ L.

	Ft.	In.
Coal (slate roof and floor)	1	11

Gauley Coal Land Company Prospect No. 3— No. 247 on Map II.

On the west side of Smokehouse Ridge, 1.4 miles northeast of mouth of Smokehouse Branch; Gauley Coal Land Company authority for this section; **Little Raleigh Coal**; elevation, 3639′ L.

	Ft.	In.
Coal (slate floor)	2	11

Gauley Coal Land Company Prospect No. 19— No. 248 on Map II.

On the east side of Smokehouse Ridge, 0.25 mile northwest of the mouth of Oldhouse Branch and 2.3 miles southeast of Duo; Gauley Coal Land Company authority for this section; **Little Raleigh Coal?**; elevation, 3716′ L.

	Ft.	In.
Coal (slate floor)	2	0

Prospect—No. 249 on Map II.

On southwest end of Hickory Ridge, 3.85 miles northeast of Rupert and 2.45 miles south of Anjean; **Little Raleigh Coal?**; elevation, 3630′ B.

	Ft.	In.
Coal, (reported by Golden Jones), 3′ to	4	0

Prospect—No. 250 on Map II.

On northeast end of Hickory Ridge, 5.2 miles northeast of Rupert and 2.9 miles southeast of Anjean; **Little Raleigh Coal?**; elevation, 3930′ B.

	Ft.	In.
Coal, (reported by B. M. Higginbotham)	4	0

Prospect—No. 251 on Map II.

On west end of Long Point, 3.9 miles east of Rupert; **Little Raleigh Coal?**; elevation, 3645′ B.

	Ft.	In.
Coal, (reported by B. M. Higginbotham)	4	0

Prospect—No. 252 on Map II.

On west side of Buffalo Mountain, 3.65 miles west of Williamsburg; Little Raleigh Coal; elevation, 3930′ B.

	Ft.	In.
Coal, (reported by B. M. Higginbotham)	2	4

Little Raleigh Coal, Williamsburg District.

Very little prospecting for Little Raleigh Coal has been done in Williamsburg District. The sections shown in the following prospects and openings indicate that further prospecting is highly desirable:

Gauley Coal Land Company Prospect No. 466—No. 253 on Map II.

On the northeast side of Beech Ridge, 1.55 miles east of Clearco; Gauley Coal Land Company authority for this section; Little Raleigh Coal; elevation, 3517′ L.

			Ft.	In.
Coal	4′	2″		
Slate	3	0		
Coal	0	5	7	7

Gauley Coal Land Company Prospect No. 465B—No. 254 on Map II.

On the waters of Hogcamp Run, 1.25 miles southwest of its mouth and 2.1 miles east of Beech Knob; Gauley Coal Land Company authority for this section; Little Raleigh Coal; elevation, 3386′ L.

			Ft.	In.
Coal	3′	10″		
Slate	1	3		
Coal	0	8	5	9

T. B. Lilly Mine—No. 255 on Map II.

Farm mine, on the north side of McMillion Creek, 2.4 miles south 9° east of Eureka School and 1.1 miles northeast of Lile; observation by Reger; Little Raleigh Coal; elevation, 3040′ B.

	Ft.	In.
Fallen shut, coal reported 3′ 0″ to	4	0

The above opening was described by Reger under No. 1264 in the Nicholas County Report, page 344, as occurring in the Beckley seam, but after tracing the coal across Greenbrier it apparently proves to be at the Little Raleigh horizon.

Levi Lilly Heirs Mine—No. 256 on Map II.

Farm mine, on north bank of McMillion Creek, 2.1 miles south 30° east of Eureka School and 1.6 miles northeast of Lile; observation by Reger; Little Raleigh Coal; elevation, 3015′ B.

			Ft.	In.
Sandstone, massive				
Coal, soft	1′	4″		
Coal, bony	0	8	2	0
Slate, bony			2	0

The above opening was described by Reger under No. 1263 in the Nicholas County Report, page 344, as occurring in the Beckley seam, but after tracing this coal across Greenbrier it apparently proves to be at the Little Raleigh horizon.

Gauley Coal Land Company (?) Mine—No. 257 on Map II.

On the Jetsville-Manning Knob road, 4.4 miles northeast of Lile and 4 miles north of Clearco; Little Raleigh Coal; elevation, 3485′ B.

			Ft.	In.
Coal	1′	8″		
Shale	0	2		
Coal	0	6	2	4

Coal Blossom—No. 257A on Map II.

On Cold Knob road, 4.15 miles south of Richwood and 0.7 mile southeast of Manning Knob; Little Raleigh Coal; elevation, 3520′ B.

	Ft.	In.
Coal blossom, thickness not determined	....	....

Quantity of Little Raleigh Coal Available.

The estimates in the following table have been computed from planimetric measurement of outcrop outlined on work sheets for the areas indicated on Figure 19, page 531, and show the probable amount of Little Raleigh Coal in Greenbrier County:

Probable Amount of Little Raleigh Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal (2000 Lbs.)
Meadow Bluff	2	26.5	16,960	1,477,555,200	59,102,208
Williamsburg	3	7.0	4,480	585,446,400	23,417,856
Totals		33.5	21,440	2,063,001,600	82,520,064

BECKLEY COAL.

The Beckley Coal previously discussed in Chapter VI, pages 236-7, ranks fourth in available tonnage within the county. In general this coal is from 2 to 5 feet thick. In appearance and chemical properties the Beckley Coal is quite similar to the Sewell seam and in at least one instance this fact has led to confusion in correlating from one area to another.

The first commercial mine (Lost Flat—No. 307 on Map II) in the county was opened in this seam in Falling Springs District in 1907. This mine was abandoned in 1910 when the same company opened the Spruce Knob Mine (No. 225 on Map II) on North Fork of Cherry River. At present (1936) there are no actively operating mines in this seam.

The probable minable area of Beckley Coal is shown on Figure 19, page 531, but the coal is not outcropped on Map II, as it is only 50 to 80 feet above the Fire Creek and its position may readily be interpolated from the position of the latter.

Beckley Coal, Meadow Bluff District.

In this district the Beckley Coal reaches its best development on Little Clear Creek Mountain where there is a fairly large area of coal with a thickness of 3 to 5 feet. Over much

of the rest of the area indicated on Figure 19, page 531, for this district, this coal is generally between 2 and $3\frac{1}{2}$ feet thick and while it may not be profitable to mine this thinner coal at the present time, it should be considered a minable reserve.

Because of insufficient information, the Beckley Coal is not shown on Figure 19 as minable in Hickory Ridge, Cross Mountain, and Buffalo Mountain. Future prospecting, however, may prove it to be present in these areas in commercial thickness.

The Beckley Coal is noted in the records of coal test borings Nos. 5, 6, 11, 12, and 14, the details of which are published on preceding pages. In addition its stratigraphic position is shown in the partial records of coal test borings Nos. 5A, 5B, 5C, 5D, 5F, 5G, 5H, and 5K. The following openings and prospects were noted:

Tuck Brothers Mine—No. 258 on Map II.

On Fayette-Greenbrier County line, 0.8 mile north of Rainelle; **Beckley Coal**; elevation, 2815′ B.

				Ft.	In.
1.	Slate, draw			1	6
2.	**Coal, bony**	0′	2″		
3.	Bone	0	1		
4.	**Coal, columnar**	0	6		
5.	Fusain (mineral charcoal)	0	$0\frac{1}{4}$		
6.	**Coal**	0	3		
7.	Fussain (mineral charcoal)	0	$0\frac{1}{4}$		
8.	**Coal, columnar**	1	$7\frac{1}{2}$		
9.	**Coal**, bony	0	4	3	0

A sample (No. 150PH) was taken from Nos. 4, 5, 6, 7, and 8 of the above section, the analysis of which is published under **No. 258** in the Table of Coal Analyses at the end of this Chapter.

Meadow River Lumber Company? Prospect—No. 259 on Map II.

On north end of Little Sewell Mountain, 0.95 mile northeast of East Rainelle; **Beckley Coal**; elevation, 3080′ B.

	Ft.	In.
Shale, black, concretions	8	0
Coal (slate floor)	2	8

Gauley Coal Land Company? Mine (Abandoned)—No. 260 on Map II.

Truck mine, on the west side of Big Clear Creek, at the stream and road crossing, 0.95 mile southwest of Duo and 3.2 miles northeast of Anjean; has been mined for local use; **Beckley Coal**; elevation, 3160′ B.

	Ft.	In.
Sandstone, grayish-white		
Coal, good	2	6
Shale	10	2
Sandstone, shaly		

Raine Lumber and Coal Company Prospect—No. 261 on Map II.

On the east side of Big Clear Creek, 1.2 miles southwest of Duo and 3 miles northeast of Anjean; **Beckley Coal**; elevation, 3190′ B.

			Ft.	In.
Coal, bony (sandstone roof)	0′	3″		
Coal, weathered	1	11	2	2
Concealed				

L. E. McClung Prospect—No. 262 on Map II.

On the west side of Shellcamp Ridge, 2 miles southwest of Duo and 2.25 miles northeast of Anjean; fallen shut, reported by L. E. McClung; **Beckley Coal**; elevation, 3285′ B.

			Ft.	In.
Shale, black				
Coal, shale partings	3′	4″		
Shale	2	0		
Coal	1	10	7	2

L. E. McClung Prospect—No. 263 on Map II.

On the west side of Shellcamp Ridge, 2.15 miles southwest of Duo and 2.1 miles northeast of Anjean; **Beckley Coal**; elevation, 3310′ B.

			Ft.	In.
Shale, black				
Coal	0′	5″		
Shale	0	1		
Coal	0	0½		
Shale	0	0½		
Coal	0	3½		
Fusain (mineral charcoal)	0	0½		
Coal, laminated	2	6	3	5

Gauley Coal Land Company Prospect No. 4—No. 264 on Map II.

On the east side of Smokehouse Branch, 1.45 miles northeast of its mouth and 1.75 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3544′ L.

	Ft.	In.
Coal (slate roof and floor)	1	10

Gauley Coal Land Company Prospect No. 2—No. 265 on Map II.

On the east side of Smokehouse Branch, 1.25 miles northeast of its mouth and 1.7 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3513′ L.

	Ft.	In.
Coal (slate floor)	2	2

Gauley Coal Land Company Prospect No. 9—No. 266 on Map II.

On the east side of Smokehouse Branch, 1 mile northeast of its mouth and 1.8 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3514′ L.

			Ft.	In.
Coal (slate roof)	0′	6″		
Fire clay	0	2		
Coal (slate floor)	2	7	3	3

Gauley Coal Land Company Prospect No. 14—No. 267 on Map II.

On the east side of Smokehouse Ridge, 0.35 mile north of the mouth of Job Knob Branch and 2.6 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3640′ L.

	Ft.	In.
Coal (slate floor)	2	0

Gauley Coal Land Company Prospect No. 15—No. 268 on Map II.

On the east side of Smokehouse Ridge, 0.6 mile north of mouth of Job Knob Branch and 2.45 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3646′ L.

	Ft.	In.
Coal (slate roof and floor)	2	8

Gauley Coal Land Company Prospect No. 18—
No. 269 on Map II.

On the east side of Smokehouse Ridge, 2.35 miles southeast of Duo and 5.15 miles northeast of Anjean; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3615′ L.

	Ft.	In.
Coal (slate roof and floor)	2	6

Gauley Coal Land Company Prospect No. 22—
No. 270 on Map II.

On the east side of Oldhouse Branch, 0.55 mile north of its mouth and 2.6 miles east of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3591′ L.

			Ft.	In.
Bone and coal (slate roof)	0′	4″		
Coal (slate floor)	2	1½	2	5½

Gauley Coal Land Company Prospect No. A237—
No. 271 on Map II.

On the north side of Rockcamp Ridge, 1.25 miles south of Job Knob; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3734′ L.

	Ft.	In.
Coal	2	11

Gauley Coal Land Company Prospect No. A236—
No. 272 on Map II.

On the north side of Rockcamp Ridge, 1.4 miles south of Job Knob; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3793′ L.

	Ft.	In.
Coal	2	5

Gauley Coal Land Company Prospect No. A235—
No. 273 on Map II.

On the south side of Rockcamp Ridge, 1.6 miles southeast of Job Knob; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3616′ L.

	Ft.	In.
Coal and slate	1	9

Gauley Coal Land Company Prospect No. A234—
No. 274 on Map II.

On the south side of Rockcamp Ridge, 1.5 miles southeast of Job Knob; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3863′ L.

	Ft.	In.
Coal and slate	2	0½

Gauley Coal Land Company Prospect No. A130—No. 275 on Map II.

On Old Field Mountain just south of Grassy Knob, 5.45 miles east of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 4213′ L.

	Ft.	In.
Coal	2	2

Gauley Coal Land Company Prospect No. A129—No. 276 on Map II.

On Old Field Mountain, 7 miles east of Anjean and 5.4 miles southeast of Duo; Beckley Coal; elevation, 4162′ L.

		Ft.	In.
Coal	2′ 11″		
Coal and slate (fire clay floor)	1 0	3	11

Gauley Coal Land Company Prospect No. A127—No. 277 on Map II.

On north side of Little Clear Creek Mountain, 6.35 miles northeast of Anjean and 4.5 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3879′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	3	11

Gauley Coal Land Company Prospect No. A126—No. 278 on Map II.

On north side of Little Clear Creek Mountain just above core test No. 13, 6.15 miles east of Anjean and 4.55 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3817′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	3	5

A sample was taken from the above section by the Gauley Coal Land Company and analyzed by the Commercial Testing and Engineering Company, of Charleston, W. Va. Its analysis is published under No. 278 in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A125— No. 279 on Map II.

On the north side of Little Clear Creek Mountain, 5.35 miles northeast of Anjean and 3.6 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3706′ L.

			Ft.	In.
Bone and coal (slate roof)	0′	2½″		
Coal	0	10		
Slate and coal	0	1		
Coal (fire clay floor)	2	3½	3	5

Gauley Coal Land Company Prospect No. A122— No. 280 on Map II.

On north side of Little Clear Creek Mountain, 4.3 miles northeast of Anjean and 3.2 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3714′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	2	7

Gauley Coal Land Company Prospect No. A121— No. 281 on Map II.

On the north side of Little Clear Creek Mountain, 4.2 miles northeast of Anjean and 3.35 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3732′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	3	1

Gauley Coal Land Company Prospect No. A120— No. 282 on Map II.

On the north side of Little Clear Creek Mountain, 4 miles northeast of Anjean and 3.45 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3740′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	2	7

The above opening may be in the "Split" seam coming a few feet under the Beckley proper.

In the vicinity of Joe Knob so many prospect openings have been made in or near the Beckley Coal horizon that it was not possible to show all of them on Map II. A seam between the Beckley and Fire Creek has been opened in several places on the knob. This seam is classified as the "Split" seam on the Gauley Coal Land Company's maps but it it not cer-

tain whether it is a true split off the Beckley Coal or a separate lenticular coal bed. This lower seam is 10 to 40 feet below the Beckley Coal and shows a variable but sometimes good section of coal. Descriptions of the Beckley and "Split" seam prospects on Joe Knob follow:

Gauley Coal Land Company Prospect No. A116—No. 283 on Map II.

On the northeast side of Joe Knob, 3.25 miles east of Anjean; Gauley Coal Land Company authority for this section; **Beckley Coal**; elevation, 3718′ L.

			Ft.	In.
Coal (slate floor)			3	7

Gauley Coal Land Company Prospect No. A115—No. 284 on Map II.

On the north side of Joe Knob, 3.1 miles east of Anjean; Gauley Coal Land Company authority for this section; **Beckley Coal**; elevation 3714′ L.

			Ft.	In.
Coal and slate (slate floor)	1′	5″		
Coal (slate floor)	3	2	4	7

The "Split" seam has been opened immediately below No. 284 and shows the following section:

Gauley Coal Land Company Prospect No. 157—Not Shown on Map II.

On the north side of Joe Knob, 3.1 miles east of Anjean; Gauley Coal Land Company authority for this section; **"Split" Coal** elevation, 3688′ L.

			Ft.	In.
Bone (slate roof)	0′	5″		
Slate	0	0½		
Coal (sandstone floor)	4	4	4	9½

Gauley Coal Land Company Prospect No. A114—No. 285 on Map II.

On west side of Joe Knob, 2.85 miles east of Anjean; Gauley Coal Land Company authority for this section; **Beckley Coal**; elevation, 3671′ L.

			Ft.	In.
Coal (slate floor)			5	6½

The "Split" seam has been opened immediately below No. 285 and shows the following:

Gauley Coal Land Company Prospect No. 154—Not Shown on Map II.

On west side of Joe Knob, 2.85 miles east of Anjean; Gauley Coal Land Company authority for this section; "Split" Coal; elevation, 3658′ L.

	Ft.	In.
Coal (no top; sandstone floor)	2	6½

Gauley Coal Land Company Prospect No. A109—No. 286 on Map II.

On the southwest side of Joe Knob, 2.9 miles east of Anjean; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3694′ L.

			Ft.	In.
Coal	1′	11″		
Slate	0	0½		
Coal	0	11		
Slate	0	0½		
Coal	2	6½		
Coal and slate (fire clay floor)	0	3½	5	9

The "Split" seam has been opened 0.2 mile southeast of No. 286 and shows the following:

Gauley Coal Land Company Prospect No. 153—Not Shown on Map II.

On south side of Joe Knob, 3.1 miles east of Anjean; Gauley Coal Land Company authority for this section; "Split" Coal; elevation, 3696′ L.

	Ft.	In.
Coal (no top; fire clay floor)	2	6

Gauley Coal Land Company Prospect No. A108—No. 287 on Map II.

On the south side of Joe Knob, 3.3 miles east of Anjean; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3771′ L.

			Ft.	In.
Coal	2′	10″		
Coal and slate	0	3		
Coal (slate floor)	1	8	4	9

Gauley Coal Land Company Prospect No. A119—No. 288 on Map II.

On the east side of Briery Knob, 2.8 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Beckley Coal**; elevation, 3578′ L.

			Ft.	In.
Bone (slate roof)	0′	9½″		
Coal (fire clay floor)	2	9	3	6½

Gauley Coal Land Company Prospect No. A118—No. 289 on Map II.

On the north side of Briery Knob, 2.6 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Beckley Coal**; elevation, 3530′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	3	8½

A sample was collected from the above section by the Gauley Coal Land Company and analyzed by the Commercial Testing and Engineering Company, of Charleston, W. Va. The analysis as reported by the former company is published under **No. 289** in the Table of Coal Analyses at the end of this chapter.

Gauley Coal Land Company Prospect No. A117—No. 290 on Map II.

On the northwest side of Briery Knob, 2.5 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Beckley Coal**; elevation, 3539′ L.

			Ft.	In.
Slate and bone (slate roof)	0′	6″		
Coal	0	10		
Slate	0	8		
Coal	1	2		
Slate and **coal**	0	10		
Coal (fire clay floor)	1	2	5	2

Gauley Coal Land Company Prospect No. A113—No. 291 on Map II.

On the north side of Little Clear Creek Mountain, 1.8 miles east of Anjean and 1.35 miles west of Joe Knob; Gauley Coal Land Company authority for this section; **Beckley Coal?**; elevation, 3568′ L.

	Ft.	In.
Coal (slate roof)	0	10

Gauley Coal Land Company Prospect No. A112—No. 292 on Map II.

On the north side of Little Clear Creek Mountain, 1.35 miles east of Anjean and 1.8 miles west of Joe Knob; Gauley Coal Land Company authority for this section; Beckley Coal?; elevation, 3534′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	0	10

Gauley Coal Land Company Prospect No. A111—No. 293 on Map II.

On north side of Little Clear Creek Mountain, 1.35 miles southeast of Anjean and 2.1 miles southwest of Joe Knob; Gauley Coal Land Company authority for this section; Beckley Coal?; elevation, 3556′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	1	5½

Gauley Coal Land Company Prospect No. A110—No. 294 on Map II.

On the south side of Little Clear Creek Mountain, 1.9 miles southeast of Anjean and 1.4 miles southwest of Joe Knob; Gauley Coal Land Company authority for this section; Beckley Coal?; elevation, 3612′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	1	10

Gauley Coal Land Company Prospect No. A107—No. 295 on Map II.

On the south side of Little Clear Creek Mountain, 3.8 miles east of Anjean and 3.8 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3746′ L.

	Ft.	In.
Coal (slate top; slate floor)	2	10

Gauley Coal Land Company Prospect No. A106—No. 296 on Map II.

On Graham Smokeless Coal Company property; on the south side of Little Clear Creek Mountain, 4.1 miles east of Anjean and 4.2 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3737′ L.

	Ft.	In.
Coal (slate top; fire clay floor)	3	2

Gauley Coal Land Company Prospect No. A105—No. 297 on Map II.

On Graham Smokeless Coal Company property; on the south side of Little Clear Creek Mountain, 4.3 miles east of Anjean and 3.9 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3727′ L.

	Ft.	In.
Coal (slate top; fire clay floor)	3	2

Gauley Coal Land Company Prospect No. A104—No. 298 on Map II.

On Graham Smokeless Coal Company property; on the south side of Little Clear Creek Mountain, 4.65 miles east of Anjean and 4.35 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3748′ L.

	Ft.	In.
Coal	3	5

Gauley Coal Land Company Prospect No. A102—No. 299 on Map II.

On the head of Little Clear Creek on the south side of Little Clear Creek Mountain, 6 miles east of Anjean and 4.5 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal?; elevation, 3904′ L.

	Ft.	In.
Coal (slate roof)	2	1

Gauley Coal Land Company Prospect No. A101—No. 300 on Map II.

On the east side of Little Clear Creek near its source, 5.65 miles east of Anjean and 4.6 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3865′ L.

	Ft.	In.
Coal (slate roof and floor)	3	3

Gauley Coal Land Company Prospect No. A100—No. 301 on Map II.

On the east side of Little Clear Creek near its source, 5.55 miles east of Anjean and 4.55 miles southeast of Duo; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3855′ L.

	Ft.	In.
Coal (slate roof and floor)	3	2½

Beckley Coal, Williamsburg District.

Only one farm mine and three prospects in the Beckley Coal were noted in this district. The horizon of this coal is present over a larger area in this district than is shown as minable on Figure 19, page 531, and warrants further prospecting.

Gauley Coal Land Company Prospect No. 151—No. 302 on Map II.

On the head of Flynn Creek, 2.9 miles northwest of Trout P. O.; Gauley Coal Land Company authority for this section; Beckley Coal?; elevation, 4040′ L.

	Ft.	In.
Coal	0	10

Gauley Coal Land Company Prospect—No. 303 on Map II.

On the waters of Hogcamp Run, 1.2 miles southwest from its mouth and 2.1 miles east of Beech Knob; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3273′ L.

			Ft.	In.
Coal	0′	6″		
Slate	1	0		
Coal	1	0		
Slate	0	4		
Coal	0	6	3	4

Gauley Coal Land Company Prospect No. 465—No. 304 on Map II.

1.55 miles northeast of Lile and 1.5 miles northeast of Beech Knob; Gauley Coal Land Company authority for this section; Beckley Coal; elevation, 3223′ L.

	Ft.	In.
Coal	3	0

Laurel Manufacturing Company Mine—No. 305 on Map II.

Farm mine, on the south side of McMillion Creek, 1.7 miles northeast of Lile; observation by Reger; Beckley Coal; elevation, 3000′ B.

			Ft.	In.
Coal, bony (slate roof)	0′	11″		
Slate, bony	0	4		
Coal, soft (slate floor)	2	0	3	3

This opening was described by Reger under No. 1276 in the Nicholas County Report, page 715, as occurring in the Fire Creek seam, but after tracing this coal across Greenbrier it apparently proves to be at the Beckley horizon.

Beckley Coal, Falling Springs District.

With the exception of one reported opening on Buffalo Mountain, the two abandoned mine openings and the prospect near them on Lost Flat are the only points at which the Beckley Coal was noted in this district. As shown on the Lost Flat Mine map the thickness of the coal ranged from one and one-half to six and one-half feet. The coal was locally absent in one part of the mine and from the reported circumstances it was probably cut out by the overlying Lower Raleigh Sandstone. It is probable that this cut-out was local and if this is true it would appear that further prospecting at this horizon in the district would be profitable.

Elk Lick Coal Company Prospect—No. 306 on Map II.

On northeast side of Lost Flat, 1.9 miles northeast of Manning Knob and 5.7 miles southeast of Richwood; Beckley Coal; elevation, 3600′ B.

	Ft.	In.
Coal	1	6

Elk Lick Coal Company "Lost Flat" Mine (Abandoned)—No. 307 on Map II.

On the east side of Lost Flat, 2.35 miles northeast of Manning Knob and 6 miles southeast of Richwood; Beckley Coal; elevation, 3640′ B.

	Ft.	In.
Coal	3	7

Elk Lick Coal Company "Old Lost Flat" Mine (Abandoned)—No. 308 on Map II.

On southeast end of Lost Flat, 2.1 miles northeast of Manning Knob and 6.1 miles southeast of Richwood; Beckley Coal; elevation, 3650′ B.

	Ft.	In.
Coal	4	0

Prospect—No. 309 on Map II.

On east side of Buffalo Mountain, 3.4 miles west of Williamsburg; Beckley Coal?; elevation, 3865′ B.

	Ft.	In.
Coal, (reported by B. M. Higginbotham), 0′ 10″ to........	1	0

Quantity of Beckley Coal Available.

The following table, computed from planimetric measurement of outcrop outlined on work sheets for the area indicated on Figure 19, page 531, gives the probable amount of Beckley Coal in Greenbrier County. The assumed thicknesses of coal shown in the table are **average** thicknesses and should **not** be used in any tabulation of coal reserves by thicknesses. A low **average** figure was used so that the total tonnage would not be too great if local areas prove to be cut out or too thin for mining:

Probable Amount of Beckley Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal (2000 Lbs.)
Meadow Bluff	2	35.5	22,720	1,979,366,400	79,174,656
Williamsburg	2	11.6	7,424	646,778,880	25,871,155
Falling Springs	3	1.0	640	83,635,200	3,345,408
Totals	....	48.1	30,784	2,709,780,480	108,391,219

Figures of the Department of Mines show that 119,522 tons of coal have been produced from mines operating the Beckley seam in Greenbrier County, all of which came from the Lost Flat Mine in Falling Springs District.

FIRE CREEK COAL.

The Fire Creek Coal, previously described in Chapter VI, page 238, ranks first in available coal in Greenbrier County. In general it varies from 1 to 6 feet in thickness and in comparatively local areas it may be entirely cut out by the overlying Quinnimont Sandstone. The ash content of the Fire Creek Coal appears to be somewhat higher than the Sewell Coal but in other respects it compares favorably with the latter coal. The probable minable area of the Fire Creek Coal is shown on Figure 20, and its detailed outcrop is outlined in blue on Map II.

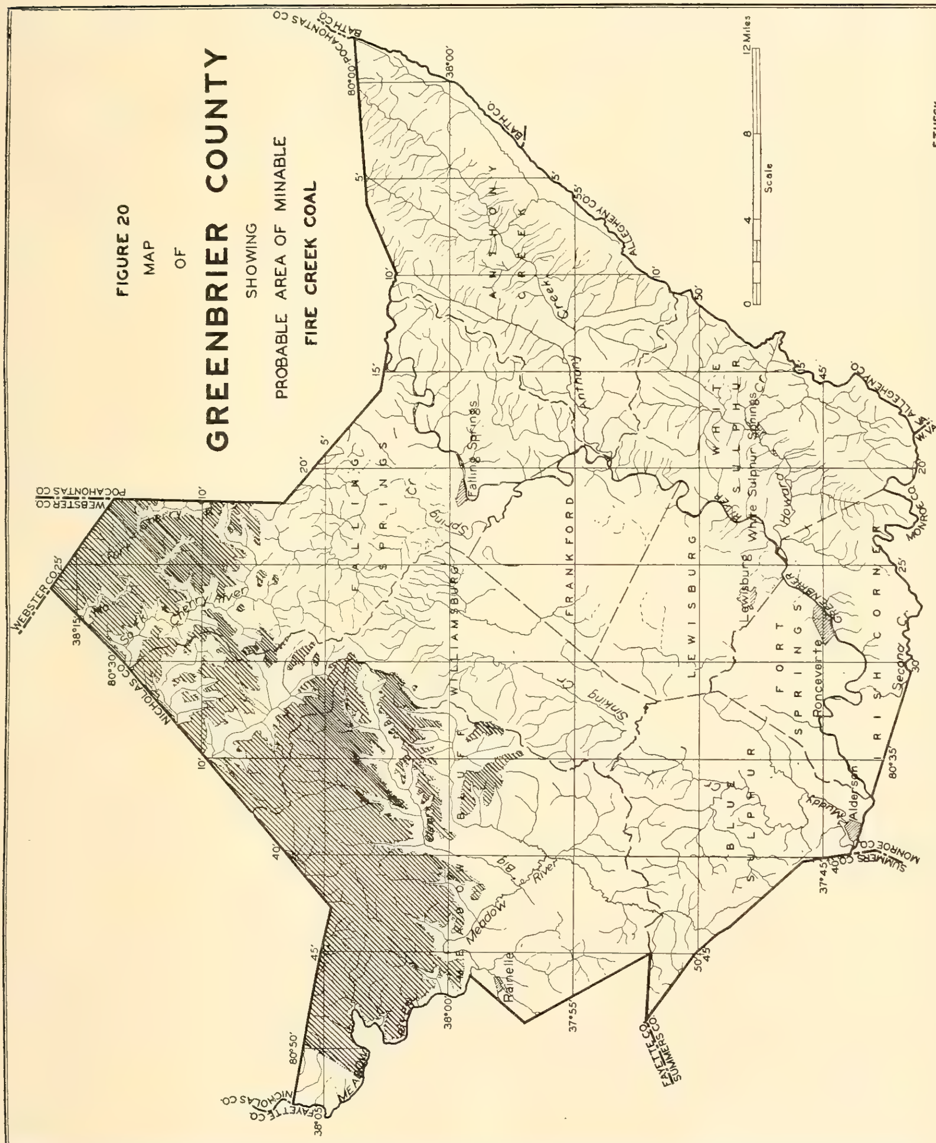


FIGURE 20
MAP
OF
GREENBRIER COUNTY
SHOWING
PROBABLE AREA OF MINABLE
FIRE CREEK COAL
WILLIAMSBURG
FRANKFORD
LEWISBURG
FALLING SPRINGS
ANTHONY CREEK
WHITE SULPHUR
FORT SPRINGS
IRISH CORNER
BLUE SULPHUR
Falling Springs
White Sulphur Springs
Lewisburg
Ronceverte
Alderson
Rainelle
POCAHONTAS CO.
WEBSTER CO.
NICHOLAS CO.
FAYETTE CO.
SUMMERS CO.
MONROE CO.
ALLEGHENY CO.
BATH CO.
Scale
12 Miles
E.T.HECK

Fire Creek Coal, Meadow Bluff District.

The best development of the Fire Creek Coal in this district is on Little Clear Creek Mountain where there is a large area of coal with a thickness in excess of 5 feet. In a large part of this district, however, this coal attains a thickness of only 2 to 3 feet. This thinner coal probably could not be mined profitably at the present time but it is here considered as a minable reserve.

The thickness and stratigraphic position of the Fire Creek Coal are noted in the Sims Station Section, Sims Mountain North End Section, and the Big Clear Creek Mountain Section, all published in Chapter V, and in the records of coal test borings Nos. 5, 11, 13, and 14, all published on preceding pages of this chapter. The stratigraphic position of this coal is shown in the partial records of coal test borings Nos. 5A, 5B, 5D, 5F, 5H, and 5I, published on preceding pages of this chapter. There are no actively operating mines in this coal at the present time (1936). The following prospects and openings were noted:

Gauley Coal and Land Company Prospect (Closed)— No. 310 on Map II.

On the west side of Burdette Creek, 0.2 mile east of Meadow River; No. 545 in Fayette Report; **Fire Creek Coal**; elevation, 2330′ B.; examined by Ray V. Hennen.

	Ft.	In.
Coal, reported by Mr. H. W. Osborne	1	6

"Sulphur spring here. This coal belongs immediately on top of a grayish-white, quartzitic sandstone (Pineville?) cliff, 30 to 50 feet thick."

Gauley Coal and Land Company Prospect (Closed)— No. 310A on Map II.

On south bank of Burdette Creek, 0.35 mile east of Meadow River; No. 546 in Fayette Report; **Fire Creek Coal**; elevation, 2340′ B.; examined by Ray V. Hennen.

	Ft.	In.
Coal, reported by Mr. H. W. Osborne	1	8

The above two prospects and comments by Ray V. Hennen are reprinted from page 820 of the Fayette County Report.

Coal exposure **No. 310B on Map II** is published in connection with the Sims Mountain—North End Section in Chapter V, page 158.

The following prospect is reprinted from page 819 of the Fayette County Report:

Thos. Stead Coal Prospect—No. 310C on Map II.

Fayette County, on south hillside of Meadow River, 2.4 miles southeast of Russellville; **Fire Creek Coal**; elevation, 2120′ B.; examined by Ray V. Hennen.

			Ft.	In.
Shale, gray, argillaceous, visible			3	0
Coal, soft	0′	7″		
Slate, black	0	$0\frac{1}{4}$		
Coal, soft (slate floor)	1	8	2	$3\frac{1}{4}$

The contours shown on the United States Geological Survey's topographic maps for the region about one mile west of Charmco do not agree with conditions found there. As a result mines Nos. 311, 312, and 428 were very difficult to locate on the map and the correlations of them are doubtful, as indicated by the question marks in the descriptive headings of these mines.

Midland Smokeless Coal Company "Midland" Mine No. 1 (Abandoned)—No. 311 on Map II.

On the property of L. E. McClung; on the southwest side of Laurel Creek Mountain, 0.65 mile northwest of Charmco and 0.27 mile north of Meadow River; **Fire Creek? (No. 7 Pocahontas?) Coal**; elevation, 2735′ B.

			Ft.	In.
1. **Coal**, hard, dull (slate roof)	0′	8″		
2. **Coal**, bright	0	$2\frac{1}{2}$		
3. Fusain (mineral charcoal)	0	$0\frac{1}{2}$		
4. **Coal**, good	0	6		
5. **Coal**, dull, hard	1	0		
6. **Coal**, laminated dull and bright	0	7		
7. Shale	0	1		
8. **Coal**, bony	1	0	4	1

A sample (No. 144PH) was taken from Nos. 2, 3, 4, 5, and 6 of the above section, the analysis of which is published under **No. 311** in the Table of Coal Analyses at the end of this chapter.

Midland Smokeless Coal Company "Midland" Mine No. 2 (Abandoned)—No. 312 on Map II.

On property of L. E. McClung; on the southwest side of Laurel Creek Mountain, 0.67 mile northwest of Charmco and 0.4 mile north of Meadow River; Fire Creek? (No. 6 Pocahontas?) Coal; elevation, 2700′ B.

			Ft.	In.
Coal, bright, laminated (shale roof)	1′	6″		
Coal, hard	0	4		
Coal, soft, columnar	0	10		
Coal, hard (slate floor)	0	4	3	0

A sample (No. 143PH) was taken from the above section, the analysis of which is published under **No. 312** in the Table of Coal Analyses at the end of this chapter.

Gauley Coal Land Company Prospect No. 562—No. 313 on Map II.

On west side of Mill Creek, 3.65 miles north of Rupert; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 2980′ L.

	Ft.	In.
Coal and slate	5	0

Gauley Coal Land Company Prospect P—No. 314 on Map II.

On east side of Mill Creek, 2.8 miles east of Charmco and 3.2 miles north of Rupert; Gauley Coal Land Company authority for this section; Fire Creek Coal?; elevation, 3005′ L.

	Ft.	In.
Coal	2	0

Gauley Coal Land Company Prospect No. 558—No. 315 on Map II.

On west side of Big Clear Creek Mountain, 1.85 miles north of Rupert; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3204′ L.

	Ft.	In.
Coal	1	10

Gauley Coal Land Company Prospect No. 559—No. 316 on Map II.

On west side of Big Clear Creek Mountain, 1.4 miles north of Rupert; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3294′ L.

	Ft.	In.
Coal and slate	3	0

Gauley Coal Land Company Prospect No. 560—No. 317 on Map II.

On west side of Big Clear Creek Mountain, 1.3 miles north of Rupert; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3299′ L.

	Ft.	In.
Coal	1	11

Gauley Coal Land Company Prospect No. 557—No. 318 on Map II.

On west side of Big Clear Creek, 1.9 miles north of Rupert; Gauley Coal Land Company authority for this section; Fire Creek Coal?; elevation, 3273′ L.

	Ft.	In.
Coal	2	1

Leckie Smokeless Coal Company Prospect—No. 319 on Map II.

On west side of Brown Creek, 1.65 miles north of mouth; Fire Creek Coal; elevation, 3028.95′ L.

			Ft.	In.
Coal (shale roof)	1′	7″		
Fusain (mineral charcoal)	0	0½		
Coal	0	10½		
Bone	0	0¼		
Coal	0	8		
Bone	0	3		
Coal	0	8		
Bone	0	2		
Coal	0	8	4	11¼

Gauley Coal Land Company Prospect No. 10—No. 320 on Map II.

On the west side of the south end of Smokehouse Ridge, 1.05 miles northeast of the mouth of Smokehouse Branch and 2.25 miles southeast of Duo; Gauley Coal Land Company authority for this section; Fire Creek Coal?; elevation, 3529′ L.

	Ft.	In.
Coal (slate floor)	1	8

Gauley Coal Land Company Prospect No. 13—No. 321 on Map II.

On the south end of Smokehouse Ridge, 0.45 mile west of the mouth of Job Knob Branch and 2.5 miles southeast of Duo; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3567′ L.

			Ft.	In.
Coal	2′	2″		
Bone	0	3		
Coal (slate floor)	1	6	3	11

Gauley Coal Land Company Prospect No. 16—No. 322 on Map II.

On the east side of Smokehouse Ridge, 0.65 mile north of the mouth of Job Knob Branch and 2.4 miles southeast of Duo; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3564′ L.

			Ft.	In.
Coal	1′	5″		
Slate	0	2		
Coal	0	9		
Slate	0	1		
Coal	1	3		
Coal and slate (slate floor)	1	4	5	0

Gauley Coal Land Company Prospect No. 20—No. 323 on Map II.

On the east side of Smokehouse Ridge, 0.2 mile northwest of the mouth of Oldhouse Branch and 2.4 miles southeast of Duo; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3526′ L.

			Ft.	In.
Coal (slate roof)	0′	9″		
Clay	0	0½		
Coal	0	10		
Coal and slate (slate floor)	1	9	3	4½

Gauley Coal Land Company Prospect No. A326—No. 324 on Map II.

On the southeast side of Job Knob Branch, 1.95 miles northeast of mouth; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3647′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	1	10

Gauley Coal Land Company Prospect No. A325—No. 325 on Map II.

On the southeast side of Job Knob Branch, 1.55 miles northeast of mouth; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3638′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	2	11

Gauley Coal Land Company Prospect No. A324—No. 326 on Map II.

On the southeast side of Job Knob Branch, 1.35 miles northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3650′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	3	2½

Gauley Coal Land Company Prospect No. A322—No. 327 on Map II.

On the southeast side of Job Knob Branch, 1.2 miles northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3669′ L.

	Ft.	In.
Coal	2	9

Gauley Coal Land Company Prospect No. A321—No. 328 on Map II.

On the southeast side of Job Knob Branch, 1 mile northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3669′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	3	8½

A sample was collected from the above section by the Gauley Coal Land Company and analyzed by the Commercial Testing and Engineering Company, of Charleston, W. Va. The analysis as reported by the former company is published under **No. 328** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A320—No. 329 on Map II.

On the north side of Old Field Branch, 0.7 mile northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3690′ L.

			Ft.	In.
Bone and slate (slate roof)	0′	7″		
Coal (fire clay floor)	3	0	3	7

Gauley Coal Land Company Prospect No. A319—No. 330 on Map II.

On the north side of Old Field Branch, 0.85 mile northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3701′ L.

	Ft.	In.
Coal (fire clay floor)	3	1

A sample was taken from the above section by the Gauley Coal Land Company and analyzed by the Commercial Testing and Engineering Company, of Charleston, W. Va. The analysis as reported by the former company is published under **No. 330** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A318—No. 331 on Map II.

On the north side of Old Field Branch, 1.1 miles northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3704′ L.

	Ft.	In.
Coal (fire clay floor)	3	2

Gauley Coal Land Company Prospect No. A317—No. 332 on Map II.

On the north side of Old Field Branch, 1.25 miles northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3715′ L.

	Ft.	In.
Coal (fire clay floor)	3	5

Gauley Coal Land Company Prospect No. A316—No. 333 on Map II.

On the north side of Old Field Branch, 1.35 miles northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3712′ L.

			Ft.	In.
Coal, slate, and bone	0′	8″		
Coal (fire clay floor)	2	10	3	6

Gauley Coal Land Company Prospect No. A315—No. 334 on Map II.

On north side of Old Field Branch, 1.7 miles northeast of mouth; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3735′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	3	2

Gauley Coal Land Company Prospect No. A232—No. 335 on Map II.

On the north side of Little Clear Creek Mountain, 0.5 mile southeast of mouth of Old Field Branch and 1.95 miles east of mouth of Smokehouse Branch; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3593′ L.

			Ft.	In.
Coal (slate roof)	1′	4″		
Bone	0	1		
Coal	0	11½		
Coal, bony	0	1½		
Coal (slate floor)	1	1½	3	7½

Gauley Coal Land Company Prospect No. A231—No. 336 on Map II.

On property of Graham Smokeless Coal Company; on the north side of Little Clear Creek Mountain, 0.75 mile southeast of mouth of Old Field Branch and 1.95 miles east of mouth of Smokehouse Branch; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3634′ L.

			Ft.	In.
Coal (slate roof)	1′	1½″		
Bone	0	2½		
Coal (slate floor)	1	10½	3	2½

Gauley Coal Land Company Prospect No. A230—No. 337 on Map II.

On north side of Little Clear Creek Mountain, 0.7 mile south of mouth of Old Field Branch and 1.75 miles southeast of mouth of Smokehouse Branch; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3639′ L.

	Ft.	In.
Coal, fallen shut, exposed	2	0

Gauley Coal Land Company Prospect No. A229—No. 338 on Map II.

On the north side of Little Clear Creek Mountain, 1.45 miles east of mouth of Smokehouse Branch and 0.6 mile southwest of mouth of Old Field Branch; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3639′ L.

	Ft.	In.
Coal (fire clay floor)	3	9

Gauley Coal Land Company Prospect No. A228—No. 339 on Map II.

On the north side of Little Clear Creek Mountain, 1.4 miles southeast of mouth of Smokehouse Branch and 3.95 miles northeast of Anjean; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3658′ L.

			Ft.	In.
Coal and slate (slate roof)	0′	3″		
Coal	3	4		
Bone	0	0½		
Coal	1	1½		
Bone (sandstone floor)	0	2	4	11

Gauley Coal Land Company Prospect No. A227—No. 340 on Map II.

On the north side of Joe Knob, 1.1 miles southeast of mouth of Smokehouse Branch and 3.2 miles east of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3628′ L.

			Ft.	In.
Coal	3′	4″		
Coal and slate	0	6		
Coal (slate floor)	1	10	5	8

Gauley Coal Land Company Prospect No. A226—No. 341 on Map II.

On the north side of Little Clear Creek Mountain, 0.7 mile southeast of mouth of Smokehouse Branch and 3 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3550′ L.

			Ft.	In.
Coal (slate roof)	1′	7″		
Slate	0	1½		
Coal	2	10½		
Bone	0	3		
Coal (fire clay floor)	1	5	6	3

Gauley Coal Land Company Prospect No. A158—No. 342 on Map II.

On the east side of Briery Knob, 0.6 mile south of mouth of Smokehouse Branch and 2.9 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal?**; elevation, 3520′ L.

			Ft.	In.
Coal	1′	10″		
Bone	0	0½		
Coal (slate floor)	0	7½	2	6

Gauley Coal Land Company Prospect No. A225—No. 343 on Map II.

On the north side of Briery Knob, 2.8 miles northeast of Anjean and 0.45 mile south of mouth of Smokehouse Branch; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3439′ L.

			Ft.	In.
Bone	0′	2″		
Coal	1	8½		
Slate	0	1		
Coal	1	0½		
Bone	0	3		
Coal	0	11		
Slate	0	1½		
Coal (slate floor)	1	2	5	5½

Gauley Coal Land Company Prospect No. A224—No. 344 on Map II.

On the north side of Briery Knob, 2.6 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3397′ L.

			Ft.	In.
Coal (slate roof)	3′	3″		
Bone	0	3		
Coal	1	3		
Bone	0	3		
Fire clay	0	8		
Coal (slate floor)	1	11	7	7

Gauley Coal Land Company Prospect No. A223—No. 345 on Map II.

On the northwest side of Briery Knob, 0.6 mile northeast of mouth of Briery Creek and 2.15 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3393′ L.

			Ft.	In.
Coal	3′	6½″		
Slate	0	11		
Coal and slate	0	3		
Coal (fire clay floor)	1	7	6	3½

Gauley Coal Land Company Prospect No. A222—No. 346 on Map II.

On the north side of Briery Creek, 1.25 miles east of mouth and 2.75 miles northeast of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3527′ L.

			Ft.	In.
Coal (slate roof)	2′	11″		
Bone	0	4		
Coal	1	0		
Slate	0	2		
Coal	0	7		
Coal and bone (slate floor)	0	5	5	5

Gauley Coal Land Company Prospect No. A221—No. 347 on Map II.

On the south side of Briery Creek, 1.3 miles southeast of mouth and 2.65 miles east of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3618′ L.

			Ft.	In.
Coal and slate (slate roof)	0′	3″		
Coal	2	10½		
Bone	0	4		
Coal (fire clay floor)	2	2	5	7½

Gauley Coal Land Company Prospect No. A220—No. 348 on Map II.

On the south side of Briery Creek, 1.05 miles southeast of mouth and 2.35 miles east of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3553' L.

	Ft.	In.
Coal (slate roof; sandstone floor)	6	0

Gauley Coal Land Company Prospect No. A219—No. 349 on Map II.

On the south side of Briery Creek, 1.1 miles southeast of mouth and 2.3 miles east of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3605' L.

	Ft.	In.
Coal (fire clay floor)	4	4+

Gauley Coal Land Company Prospect No. A218—No. 350 on Map II.

On the north side of Little Clear Creek Mountain, 1.8 miles east of Anjean and 0.7 mile southeast of mouth of Briery Creek; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3493' L.

			Ft.	In.
Coal	3'	0"		
Slate	0	1½		
Coal (fire clay floor)	2	1½	5	3

Gauley Coal Land Company Prospect No. A217—No. 351 on Map II.

On the north side of Little Clear Creek Mountain, 1.35 miles east of Anjean and 0.6 mile south of mouth of Briery Creek; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3457' L.

	Ft.	In.
Coal (fire clay floor)	5	3

A sample was collected from the above section by the Gauley Coal Land Company and analyzed by the Commercial Testing and Engineering Company, of Charleston, W. Va. The analysis as reported by the former company is published under **No. 351** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A216—No. 352 on Map II.

On north side of Little Clear Creek Mountain, 0.9 mile southeast of Anjean and 1.1 miles southwest of mouth of Briery Creek; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3440′ L.

			Ft.	In.
Coal and slate (slate roof)........	0′	10″		
Coal (fire clay floor).....................	2	7	3	5

Gauley Coal Land Company Prospect No. A215—No. 353 on Map II.

On the north side of Little Clear Creek Mountain, 1.15 miles southeast of Anjean and 1.3 miles southwest of mouth of Briery Creek; Gauley Coal Land Company authority for this section; **Fire Creek Coal?**; elevation, 3503′ L.

	Ft.	In.
Coal	2	1

Gauley Coal Land Company Prospect No. A214—No. 354 on Map II.

On the north side of Little Clear Creek Mountain, 0.65 mile southeast of Anjean and 1.4 miles southwest of mouth of Briery Creek; Gauley Coal Land Company authority for this section; **Fire Creek Coal?**; elevation, 3449′ L.

	Ft.	In.
Coal	1	3

Gauley Coal Land Company Prospect No. A213—No. 355 on Map II.

On the north side of Little Clear Creek Mountain, 0.85 mile southeast of Anjean and 1.6 miles southwest of the mouth of Briery Creek; Gauley Coal Land Company authority for this section; **Fire Creek Coal?**; elevation, 3468′ L.

	Ft.	In.
Coal	1	3

Gauley Coal Land Company Prospect No. A212—No. 356 on Map II.

On the south side of Little Clear Creek Mountain, 1.9 miles southeast of Anjean and 4.15 miles south of Duo; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3534′ L.

	Ft.	In.
Coal (fire clay floor)	6	7

A sample was collected from the above section by the Gauley Coal Land Company and analysed by the Commercial Testing and Engineering Company, of Charleston, W. Va. The analysis as reported by the former company is published under No. 356 in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A211—No. 357 on Map II.

On the south side of Little Clear Creek Mountain, west side of Hog Run, 2.1 miles southeast of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3591′ L.

	Ft.	In.
Coal (fire clay floor)	5	1½

Gauley Coal Land Company Prospect No. A210—No. 358 on Map II.

On the south side of Little Clear Creek Mountain, west side of Hog Run, 2.4 miles east of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3595′ L.

	Ft.	In.
Coal (fire clay floor)	6	6

Gauley Coal Land Company Prospect No. A209—No. 359 on Map II.

On the south side of Joe Knob, 3.4 miles east of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3695′ L.

			Ft.	In.
Coal and slate (slate roof)	0′	1½″		
Coal	2	3		
Coal and bone	0	4		
Coal (slate floor)	1	6	4	2½

A sample was collected from the above section and analysed by the Commercial Testing and Engineering Company of Charleston, W. Va. The analysis as reported by the former company is published under No. 359 in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A208— No. 360 on Map II.

On the south side of Little Clear Creek Mountain, 0.65 mile northeast of Joe Knob and 1.55 miles southeast of mouth of Smokehouse Branch; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3667′ L.

			Ft.	In.
Coal (slate roof)	2′	0″		
Slate	0	0½		
Coal (sandstone floor)	2	5	4	5½

A sample was collected from the above section by the Gauley Coal Land Company and analyzed by the Commercial Testing and Engineering Company, of Charleston, W. Va. The analysis is published under **No. 360** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A207— No. 361 on Map II.

On the property of the **Graham Smokeless Coal Company**; on south side of Little Clear Creek Mountain, 0.65 mile east of Joe Knob; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3683′ L.

			Ft.	In.
Coal (slate roof)	0′	3″		
Parting	0	1		
Coal (fire clay floor)	4	2	4	6

Gauley Coal Land Company Prospect No. A206— No. 362 on Map II.

On the property of **Graham Smokeless Coal Company**; on the east side of Kuhn Branch, 1.9 miles north of mouth, and 4.3 miles east of Anjean; Gauley Coal Land Company authority for this section; **Fire Creek Coal**; elevation, 3645′ L.

			Ft.	In.
Coal and slate (slate roof)	0′	4″		
Coal	4	9	5	1
Slate (fire clay floor)			0	8

Gauley Coal Land Company Prospect No. A205— No. 363 on Map II.

On property of **Graham Smokeless Coal Company**; on east side of Point Mountain, 1.8 miles northeast of mouth of Kuhn Branch; Gauley

Coal Land Company authority for this section; Fire Creek Coal; elevation, 3685′ L.

			Ft.	In.
Coal (slate roof)	0′	$3\frac{1}{2}$″		
Slate	0	$1\frac{1}{2}$		
Coal (slate floor)	4	$11\frac{1}{2}$	5	$4\frac{1}{2}$

Gauley Coal Land Company Prospect No. A203—No. 364 on Map II.

On property of Graham Smokeless Coal Company; on east side of Little Clear Creek near head, 1.9 miles southeast of Old Field Branch, 5.2 miles east of Anjean; Gauley Coal Land Company authority for this section; Fire Creek Coal; elevation, 3735′ L.

			Ft.	In.
Coal (slate roof)	2′	7″		
Slate and bone	0	$5\frac{1}{2}$		
Coal (fire clay floor)	1	5	4	$5\frac{1}{2}$

Prospect—No. 365 on Map II.

On head of Stony Run, 4.55 miles east of Rupert and 2.1 miles north of Kieffer; Fire Creek Coal?; elevation, 3565′ B.

	Ft.	In.
Coal, (reported by B. M. Higginbotham)	3	0

Deats Mine (Abandoned)—No. 366 on Map II.

Farm mine, on west side of Cross Mountain, 4.75 miles east of Rupert and 1.75 miles north of Kieffer; Fire Creek Coal?; elevation, 3610′ B.

	Ft.	In.
Coal, (reported by B. M. Higginbotham)	3	6

Fire Creek Coal, Williamsburg District.

An area of 22 square miles in this district should contain the Fire Creek Coal. It is believed that this coal is of minable thickness over much if not all of this area and that further prospecting is warranted. The following prospects and openings were noted:

Mine (Abandoned)—No. 367 on Map II.

Farm mine, on east side of Buffalo Mountain, 3.5 miles west of Williamsburg; Fire Creek Coal?; elevation, 3810′ B.

	Ft.	In.
Coal, (opening fallen shut, thickness reported)	2	11

Gauley Coal Land Company Prospect No. 150— No. 368 on Map II.

On the east end of Little Clear Creek Mountain, 0.15 mile southeast of Drill hole No. 14; Gauley Coal Land Company authority for this section; **Fire Creek Coal?**; elevation, 4034′ L.

	Ft.	In.
Coal	1	0

Prospect—No. 369 on Map II.

On northeast side of Laurel Creek, 3.6 miles northeast of Beech Knob and 2.3 miles southwest of Baber School; **Fire Creek Coal**; elevation, 3261′.

	Ft.	In.
Coal, reported to be dirty with a thickness of	4	2

Fire Creek Coal, Falling Springs District.

An area of 36.5 square miles in this district should contain Fire Creek Coal. It is believed that this coal is of minable thickness over much if not all of this area and that further prospecting is warranted. The following prospect and exposures were noted:

Cherry River Boom and Lumber Company? Prospect— No. 370 on Map II.

Located 0.75 mile southeast of Manning Knob and 5 miles northeast of Clearco; **Fire Creek Coal**; elevation, 3675′ B.

	Ft.	In.
Shale, black, pelecypods		
Coal (fallen shut, reported)	3	2

The above opening had fallen shut but a sample of coal was collected from the dump. The analysis of this sample (No. 162PH) is published under **No. 370** in the Table of Coal Analyses at the end of this Chapter.

Coal Exposure—No. 370A on Map II.

On Cold Knob road, 0.4 mile southeast of Manning Knob and 4 miles south of Richwood; **Fire Creek Coal**; elevation, 3375′ B.

			Ft.	In.
Coal	0′	6″		
Fire clay	5	0		
Coal	0	6	6	0

Coal Exposure—No. 370B on Map II.

On Cold Knob road, 0.7 mile southeast of Manning Knob and 0.9 mile northwest of Blue Knob; **Fire Creek Coal**; elevation, 3677′ L.

	Ft.	In.
Coal, thickness not determined..		

Coal Exposure—No. 370C on Map II.

On Cold Knob road, 0.48 mile southwest of Blue Knob and 0.9 mile northwest of Big Bull Hill; **Fire Creek Coal**; elevation, 3865′ B.

	Ft.	In.
Coal and black shale, thickness not determined..............		

Coal Exposure—No. 370D on Map II.

On Cold Knob road, 0.57 mile south of Blue Knob and 0.7 mile northwest of Big Bull Hill; **Fire Creek Coal**; elevation, 3930′ B.

	Ft.	In.
Coal, exposed	1	6

Coal Exposure—No. 370E on Map II.

On Cold Knob road, 0.72 mile south of Blue Knob and 0.42 mile north of Big Bull Hill; **Fire Creek Coal**; elevation, 3950′ B.

	Ft.	In.
Coal, exposed	1	0

Quantity of Fire Creek Coal Available.

The following table, computed from planimetric measurement of outcrop shown on Map II for the area indicated on Figure 20, page 555, gives the probable amount of Fire Creek Coal in Greenbrier County. A low figure for the average thickness was assumed so that the total would not be too great if local areas prove to be cut out or too thin for mining:

Probable Amount of Fire Creek Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal (2000 Lbs.)
Meadow Bluff	3	93.5	59,840	7,819,891,200	312,795,648
Williamsburg	2	22.0	14,080	1,226,649,600	49,065,984
Falling Springs	2	36.5	23,360	2,035,123,200	81,404,928
Totals	....	152.0	97,280	11,081,664,000	443,266,560

MINABLE COALS OF THE POCAHONTAS GROUP OF POTTSVILLE SERIES.

In general, the coals of this group are soft, columnar, and multiple-bedded. They are medium-low volatile, low sulphur, low ash, high B. T. U. coals which have a fusion point of ash ranging from 2500° F. to 2900° F. Coals with these qualities are well adapted for use in automatic stokers. In view of recent inventions it would appear that here is a large potential market for the coals of Greenbrier County.

As previously mentioned in Chapter VI, it has been necessary to consider No. 7 Pocahontas and No. 6 Pocahontas Coals together. To avoid confusion, however, the openings in each seam have been numbered consecutively and will be described separately on the following pages:

NO. 7 POCAHONTAS COAL.

No. 7 Pocahontas Coal, Meadow Bluff District.

In general, the coal that is here provisionally correlated as the No. 7 Pocahontas Coal is soft, columnar, and multiple-bedded, and ranges in thickness from 4 feet to the vanishing point. This coal has been mined on the south end of Little Sewell Mountain, near the mouth of Meadow Creek, in the vicinity of Charmco and on the south end of Big Clear Creek

Mountain. These are all truck mines and only two (Nos. 385A and 400) are in regular operation at the present time (1936).

Due to the apparently irregular nature of this seam the present information is not considered sufficient to predict the probable minable area or to estimate the available tonnage.

W. H. Sims Coal Prospect—No. 379 on Map II.

On the east side of Sims Mountain, 400 to 500 feet due south of Sims School and 2 miles due south of Rainelle; described by Ray V. Hennen under No. 264 on page 321, Fayette County Report; **No. 7 Pocahontas Coal?**; elevation, 3035′ B.

			Ft.	In.
Coal, bony and slaty	1′	0″		
Coal, soft, columnar	1	6	2	6

Coal Prospect—No. 380 on Map II.

On Wm. Bennett land, on east side of road on Little Sewell Mountain, 2.1 miles southwest of Rupert and 1.7 miles northeast of Meadowvale School; **No. 7 Pocahontas Coal**; elevation, 3200′ B.

	Ft.	In.
Coal (opening partially filled with water)	2	8+

C. N. Callison Mine (Abandoned)—No. 381 on Map II.

On southwest side of Little Sewell Mountain, 2.2 miles south southwest of Rupert and 1.75 miles northeast of Meadowvale School; **No. 7 Pocahontas Coal**; elevation, 3230′ B.

	Ft.	In.
Coal (shale roof)	3	5+

The opening was partially filled with water. A sample (No. 135PII) was taken from the upper 3 feet 5 inches of coal, the analysis of which is published under **No. 381** in the Table of Coal Analyses at the end of this Chapter.

Coal Mine (Abandoned)—No. 382 on Map II.

On southwest side of Little Sewell Mountain, 2.25 miles south-southwest of Rupert and 1.85 miles northeast of Meadowvale School; **No. 7 Pocahontas Coal**; elevation, 3250′ B.

	Ft.	In.
Coal, reported (fallen shut)	1	0

Fossil collection No. 140 taken from roof shales.

E. H. Callison Mine (Abandoned)—No. 383 on Map II.

On south end of Little Sewell Mountain, 2.5 miles south of Rupert and 1.8 mile east of Meadowvale School; **No. 7 Pocahontas Coal**; elevation, 3285′ B.

			Ft.	In.
Coal, bony	0′	3″		
Coal, block	0	3		
Pyrite	0	$0\frac{1}{4}$		
Coal, columnar, laminated with fusain (mineral charcoal)	0	9		
Coal, hard	0	5		
Coal, laminated with fusain (mineral charcoal) and pyrite	1	4		
Coal, bony	0	4	3	$4\frac{1}{4}$

A sample (No. 136PH) was taken from the above section, the analysis of which is published under **No. 383** in the Table of Coal Analyses at the end of this Chapter.

Evely Mine (Abandoned)—No. 384 on Map II.

On south side of Meadow Creek, 0.2 mile east of mouth; **No. 7 Pocahontas Coal**; elevation, 2525′ B.

			Ft.	In.
1. Slate, black (roof not good)			0	6
2. **Coal**, small blocks	1′	10″		
3. **Coal**, soft, thin streaks of bone (sandstone floor)	1	8	3	6

A sample (No. 146PH) was taken from Nos. 2 and 3 of the above section, the analysis of which is published under **No. 384** in the Table of Coal Analyses at the end of this Chapter.

Coal Mine (Abandoned)—No. 385 on Map II.

Truck mine, on northwest side of Charmco-Quinwood road, 0.95 mile northeast of Charmco; used in Charmco Section; **No. 7 Pocahontas Coal**; elevation, 2695′ B.

	Ft.	In.
Coal, fallen shut, visible 2′ to	3	0

Lester Boyer Mine—No. 385A on Map II.

Truck mine, on west side of Laurel Creek, 1.35 miles northeast of Charmco; **No. 7 Pocahontas Coal**; elevation, 2695′ B.

			Ft.	In.
Coal	0′	6″		
Bone	1	0		
Coal, dirty, with bone partings	2	0	3	6

The above section was reported by one of the men working at the mine.

Gauley Coal Land Company Prospect AR—No. 386 on Map II.

On east side of Mill Creek, 2.7 miles east of Charmco and 3 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal?**; elevation, 2878′ L.

	Ft.	In.
Coal	1	6

Gauley Coal Land Company Prospect AQ—No. 387 on Map II.

On east side of Mill Creek, 2.6 miles southeast of Charmco and 2.1 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 2990′ L.

	Ft.	In.
Coal and bone	2	2

Gauley Coal Land Company Prospect AP—No. 388 on Map II.

On east side of Mill Creek, 2.5 miles southeast of Charmco and 2.05 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 2982′ L.

			Ft.	In.
Coal (sandstone roof)	0′	1″		
Slate	0	2		
Bone	0	3		
Coal	2	11½		
Bone (fire clay floor)	0	2	3	7½

Gauley Coal Land Company Prospect AN—No. 389 on Map II.

On east side of Mill Creek, 2.55 miles southeast of Charmco and 1.95 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 3001′ L.

	Ft.	In.
Coal and bone	2	4

Gauley Coal Land Company Prospect AM—No. 390 on Map II.

On east side of Mill Creek, 2.6 miles southeast of Charmco and 1.9 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 3006′ L.

	Ft.	In.
Coal and bone	1	11

Gauley Coal Land Company Prospect AL—No. 391 on Map II.

On east side of Mill Creek, 2.75 miles southeast of Charmco and 1.75 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 3036′ L.

	Ft.	In.
Coal and bone	2	7

Gauley Coal Land Company Prospect AK—No. 392 on Map II.

On east side of Mill Creek, 2.4 miles southeast of Charmco and 1.8 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 3003′ L.

	Ft.	In.
Coal	2	2

Gauley Coal Land Company Prospect AJ—No. 393 on Map II.

On the east side of Mill Creek, 2.2 miles southeast of Charmco and 1.95 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 2966′ L.

			Ft.	In.
Coal	1′	3″		
Bone	0	2		
Coal (fire clay floor)	1	2	2	7

Gauley Coal Land Company Prospect AI—No. 394 on Map II.

On the east side of Mill Creek, 2.2 miles southeast of Charmco and 1.95 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 2956′ L.

			Ft.	In.
Coal	0′	5″		
Bone	0	1		
Coal (fire clay floor)	2	6	3	0

Gauley Coal Land Company Prospect No. 603— No. 395 on Map II.

On east side of Mill Creek Mountain, 2.15 miles southeast of Charmco and 1.95 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 2957′ L.

	Ft.	In
Coal	1	6

Gauley Coal Land Company Prospect AH—No. 396 on Map II.

On east side of Mill Creek, 2.15 miles southeast of Charmco and 1.85 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 2946′ L.

	Ft.	In.
Coal	1	6

Gauley Coal Land Company Prospect J—No. 397 on Map II.

On the west side of Big Clear Creek Mountain, 1.05 miles north of Rupert; No. 7 Pocahontas Coal; Gauley Coal Land Company authority for this section; elevation, 3180′ L.

			Ft.	In.
Coal	3′	8″		
Slate	0	0½		
Coal and bone (fire clay floor)	0	3	3	11½

Gauley Coal Land Company Prospect I—No. 398 on Map II.

On west side of Big Clear Creek, 1.1 miles north of Rupert; Gauley Coal Land Company authority for this section; No. 7 Pocahontas Coal; elevation, 3168′ L.

			Ft.	In.
Coal (slate roof)	0′	3″		
Slate	0	1		
Coal	3	1½		
Slate	0	1		
Coal (fire clay floor)	0	7½	4	2

Gauley Coal Land Company Prospect H—No. 399 on Map II.

On the west side of Big Clear Creek, 1.4 miles north of Rupert; Gauley Coal Land Company authority for this section; No. 7 Pocahontas Coal; elevation, 3154′ L.

			Ft.	In.
Coal (slate roof)	3′	11½″		
Bone (fire clay floor)	0	2½	4	2

Amick Mine—No. 400 on Map II.

Truck mine, on west side of Big Clear Creek, 1.45 miles north of Rupert; No. 7 Pocahontas Coal; elevation, 3135′ L.

			Ft.	In.
Sandstone				
Bone, 1′ to			2	0
Coal, bright	1′	8″		
Coal, dull	2	0	3	8

Gauley Coal Land Company Prospect F—No. 401 on Map II.

On west side of Big Clear Creek, 2.1 miles north of Rupert; Gauley Coal Land Company authority for this section; No. 7 Pocahontas Coal?; elevation, 3093′ L.

	Ft.	In.
Coal and slate	1	0

Gauley Coal Land Company Prospect E—No. 402 on Map II.

On west side of Big Clear Creek, 3.1 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 3070′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	2	8

Gauley Coal Land Company Prospect D—No. 403 on Map II.

On west side of Big Clear Creek, 3.2 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 3066′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	3	11

Gauley Coal Land Company Prospect C—No. 404 on Map II.

On west side of Big Clear Creek, 3.3 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 3069′ L.

	Ft.	In.
Coal (slate roof; fire clay floor)	4	4

Gauley Coal Land Company Prospect A—No. 405 on Map II.

On west side of Big Clear Creek, 1.9 miles southwest of Anjean and 3.5 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal**; elevation, 3068′ L.

	Ft.	In.
Coal (fire clay floor)	3	2

Gauley Coal Land Company Prospect No. A311—No. 406 on Map II.

On the north side of Joe Knob, 1 mile southeast of mouth of Smokehouse Branch; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal?**; elevation, 3449′ L.

	Ft.	In.
Coal (slate roof and floor)	2	6

Gauley Coal Land Company Prospect No. A310—No. 407 on Map II.

On the northeast side of Briery Knob, 0.45 mile southeast of Smokehouse Branch; Gauley Coal Land Company authority for this section; **No. 7 Pocahontas Coal?**; elevation, 3374′ L.

			Ft.	In
Coal	0′	5½″		
Slate	2	4½		
Coal (slate floor)	1	7	4	5

NO. 6 POCAHONTAS COAL.

The No. 6 Pocahontas Coal, previously described in Chapter VI, ranks second in Greenbrier County in available tonnage. In general it is soft, columnar, multiple-bedded, and ranges from 1 to 5 feet in thickness. In chemical properties it is an excellent fuel, having a volatile content of 21 to 23 per cent., ash content of from 3 to 6 per cent., and a B. T. U. value that often exceeds 15,000. This coal has been mined at several points and a few small mines are in regular operation at the present time.

Figure 21 shows the probable minable extent of the No. 6 Pocahontas Coal, and its detailed outcrop is shown on Map II.

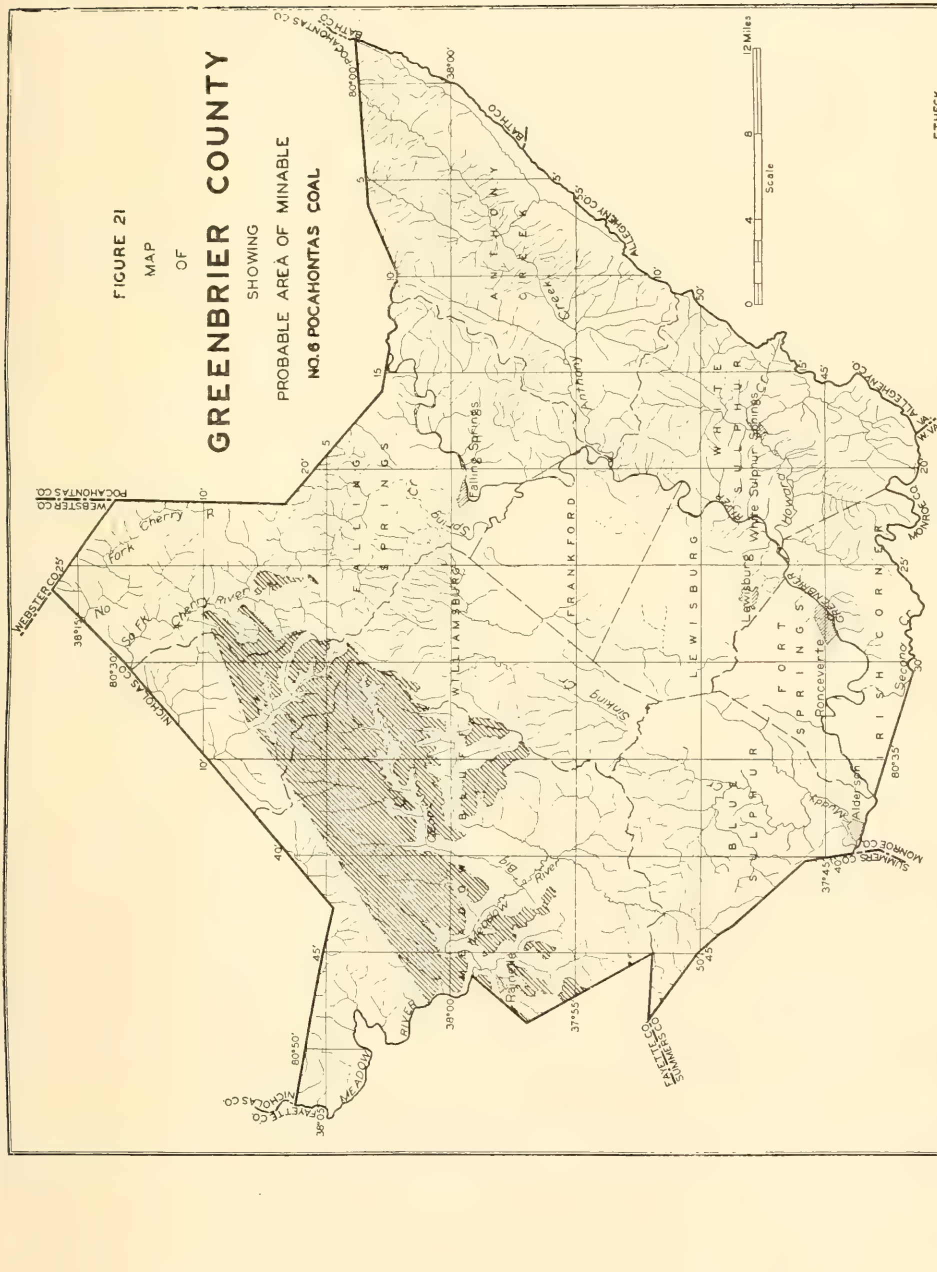


FIGURE 21
MAP
OF
GREENBRIER COUNTY
SHOWING
PROBABLE AREA OF MINABLE
NO. 6 POCAHONTAS COAL
0
4
8
12 Miles
Scale
E.T.HECK
BATH CO.
POCAHONTAS CO.
ALLEGHENY CO.
VA.
W.VA.
MONROE CO.
SUMMERS CO.
FAYETTE CO.
NICHOLAS CO.
WEBSTER CO.
ANTHONY CREEK
FALLING SPRINGS
WILLIAMSBURG
FRANKFORD
LEWISBURG
WHITE SULPHUR
FORT SPRINGS
IRISH CORNER
BLUE SULPHUR
MEADOW BLUFF
Falling Springs
White Sulphur Springs
Lewisburg
Ronceverte
Alderson
Rainelle
Anthony
Creek
Spring Cr.
Sinking Cr.
Howard Cr.
Second Cr.
Greenbrier R.
Cherry R.
No. Fork Cherry R.
So. Fk. Cherry River
Big Meadow River
Meadow River
38°00'
80°00'
38°15'
80°30'
80°35'
80°50'
37°45'
37°55'
38°05'

No. 6 Pocahontas Coal, Meadow Bluff District.

Nearly all of the prospecting and all of the mines opened in the No. 6 Pocahontas Coal are in this district. Its stratigraphic position and thickness are shown in the sections published in Chapter V for Big Clear Creek, Little Clear Creek, Little Sewell Mountain—Southeast, Little Sewell Mountain—West Side, Sims Mountain—North End, Sims School, and Sims Station, page references to which are given in the Index; and in the records of Coal Test Borings Nos. 1, 5C, 6, 11, 12, 13, 14, and 15 published on preceding pages of this Chapter. The following openings and prospects were noted:

Bellwood Coal Company Mine No. 1—No. 408 on Map II.

Fayette County, Quinnimont District; on east side of Quinton Branch, 0.85 mile south of its mouth, near Bellwood; **No. 6 Pocahontas Coal**; elevation, 2823.0′ L.

No section at mine mouth; see borings Nos. 143-152 for thickness.

Bellwood Coal Company Mine No. 2—No. 409 on Map II.

Fayette County, Quinnimont District; on east side of Quinton Branch, 1.05 miles south of its mouth, near Bellwood; **No. 6 Pocahontas Coal**; elevation, 2832.2′ L.

No section at mine mouth; see borings Nos. 143-152 for thickness.

Bellwood Coal Company Mine No. 3—No. 410 on Map II.

Fayette County, Quinnimont District; on west side of Quinton Branch, 1.1 miles south of its mouth, near Bellwood; **No. 6 Pocahontas Coal**; elevation, 2817.8′ L.

No section at mine mouth; see borings Nos. 143-152 for thickness.

George Shawver Mine—No. 411 on Map II.

Fayette County, Quinnimont District; farm mine, 2.15 miles east of Springdale and 1.05 miles southwest of Coal Hollow School; **No. 6 Pocahontas Coal**; elevation, 3065′ B.

	Ft.	In.
Shale, black, **Royal, Lingula** fossils abundant.................		
Coal, clean, columnar, with layers of fusain (mineral charcoal), (slate roof and floor)...................................	3	2

A sample (No. 132PH) was taken from the above section, the analysis of which is published under **No. 411** in the Table of Coal Analyses at the end of this Chapter.

A section was measured at the same mine by Ray V. Hennen and reported under **No. 576** in the Fayette County Report, page 855, as follows:

	Ft.	In.
Shale, black, Royal, Lingula fossils abundant................		
Coal, soft	4	0
Shale, dark and gray	10	0

Coal Exposure—No. 411A on Map II.

On public road, 2.2 miles east of Springdale and 1 mile southwest of Coal Hollow School; No. 6 Pocahontas Coal, Lower Bench; elevation, 3055′ B.

	Ft.	In.
Coal, exposed	2	0

Bert Hutsonpillar Mine—No. 412 on Map II.

Farm mine, operated by C. C. Helmick, on north side of Turniphole Mountain, 2.5 miles east of Springdale; No. 6 Pocahontas Coal; elevation, 3065′ B.

			Ft.	In.
1. Coal, bony (shale roof, poor)	0′	4″		
2. Coal, hard	0	10		
3. Coal, columnar	0	10		
4. Coal, hard	0	4		
5. Coal, bright, laminated with fusain (mineral charcoal)	1	5		
6. Coal, bony	0	4	4	1

A sample (No. 133PH) was taken from Nos. 1 to 5 inclusive of the above section, the analysis of which is published under **No. 412** in the Table of Coal Analyses at the end of this Chapter.

J. A. and S. J. Wooldridge Coal Mine—No. 413 on Map II.

Farm mine, on southeast side of Turniphole Mountain, 2.9 miles northwest of Dawson and 2.85 miles east of Springdale; No. 6 Pocahontas Coal?; elevation, 3120′ B.

			Ft.	In.
1. Sandstone, grayish-brown, cross-bedded, micaceous			50	0
2. Concealed			30	0
3. Shale, dark-gray to brown			10	0
4. Coal, bony (slate roof)........	0′	4″		
5. Coal, clean, columnar	1	10		
6. Coal, hard	0	4		
7. Coal, clean, columnar (slate floor)	2	1	4	7
8. Concealed			12	0
9. Coal (reported)			3	0

A sample (No. 131PH) was taken from Nos. 4, 5, 6, and 7 of the above section, the analysis of which is published under **No. 413** in the Table of Coal Analyses at the end of this Chapter.

Coal Prospect—No. 414 on Map II.

On Sims Mountain, on public road, 2.7 miles south of Rainelle; used in Sims Station Section, page 158; **No. 6 Pocahontas Coal?**; elevation, 3082' L.

	Ft.	In.
Coal, reported 8" to	1	0

Coal Exposure—No. 415 on Map II.

On north end of Sims Mountain, on public road, 0.4 mile south of East Rainelle; used in Sims Mountain Section—North End; **No. 6 Pocahontas Coal?**; elevation, 2840' B.

	Ft.	In.
Coal, exposed	0	2

S. H. Samples Mine (Abandoned)—No. 416 on Map II.

Farm mine, on east side of Goddard Mountain, 2.3 miles southeast of East Rainelle and 3.2 miles southwest of Rupert; **No. 6 Pocahontas Coal?**; elevation, 3085' B.

	Ft.	In.
Shale	6	0
Coal	1	10

Meadow River Fuel Company "Lincoln" Mine (Abandoned)—No. 417 on Map II.

On northwest end of Little Sewell Mountain, 0.3 mile northeast of East Rainelle; **No. 6 Pocahontas Coal**; elevation, 2780' B.

			Ft.	In.
Coal, laminated with bright and fusain (mineral charcoal), (slate roof)	0'	6"		
Coal, columnar, good	1	2		
Coal, laminated	0	10	2	6

A sample (No. 130PH) was taken from the above section, the analysis of which is published under **No. 417** in the Table of Coal Analyses at the end of this Chapter. At the point of sampling the coal measured 30 inches; however, it is reported to be 34 to 36 inches thick in most places in the mine.

Coal Exposure—No. 418 on Map II.

On west side of Little Sewell Mountain, 1 mile southeast of Rainelle; used in Little Sewell Mountain Section—West Side; No. 6 Pocahontas Coal; elevation, 2885′ B.

	Ft.	In.
Coal, soft, exposed	0	9

Coal Exposure—No. 419 on Map II.

On west side of Little Sewell Mountain, 0.7 mile northeast of Dennis and 2.25 miles southwest of Rupert; No. 6 Pocahontas Coal; elevation, 3185′ B.

	Ft.	In.
Coal, (exposed in spring on land of Mr. Dunn)	1	0

Coal Prospect—No. 420 on Map II.

On west side Little Sewell Mountain, north side of road, 0.65 mile northeast of Dennis and 2.2 miles southwest of Rupert; No. 6 Pocahontas Coal; elevation, 3200′ B.

	Ft.	In.
Coal, fallen shut, thickness reported	3	0

Coal Exposure—No. 421 on Map II.

On south end of Little Sewell Mountain, 4.1 miles southeast of East Rainelle and 2.35 miles south of Rupert; No. 6 Pocahontas Coal; elevation, 3270′ B.

	Ft.	In.
Coal	3	0

Meadow River Lumber Company Prospect—No. 422 on Map II.

On the east side of Little Sewell Mountain, 1.75 miles west of Rupert; No. 6 Pocahontas Coal; elevation, 3055′ B.

	Ft.	In.
Shale, dark		
Coal blossom		
Shale, numerous plants	3	0
Coal, fallen shut, reported	5	0

Meadow River Lumber Company Mine (Abandoned)—No. 423 on Map II.

Farm mine, 0.3 mile north of Rainelle; No. 6 Pocahontas Coal; elevation, 2710′ B.

			Ft.	In.
1. Shale, black, Royal, Lingula			8	0
2. Coal, dirty	0′	1″		
3. Coal, laminated, soft, poor	0	4		
4. Coal, columnar	0	5		
5. Coal, hard	0	5		
6. Coal, columnar, soft	0	10		
7. Coal, laminated (slate floor)	0	11	3	0

A sample (No. 139PH) was taken from Nos. 3, 4, 5, 6, and 7 of the above section, the analysis of which is published under **No. 423** in the Table of Coal Analyses at the end of this Chapter.

The section of the following abandoned mine with comments by Ray V. Hennen is reprinted from page 852 of the Fayette County Report:

Meadow River Smokeless Coal Company "Dwyer" Mine (Abandoned)—No. 424 on ap II.

Formerly J. W. Dwyer, same as Tuck Brothers Mine, owned by Meadow River Coal and Land Company; located just east of Fayette-Greenbrier County line, 0.9 mile northeast of Rainelle; **No. 6 Pocahontas Coal**; elevation, 2605′ B.

Section and sample by Ray V. Hennen at rib at starting point of crop entry off 1st left.

	Ft.	In.
1. Slate, black		
2. Slate, black, harder, cannelly, usually draw slate	0	8
3. **Coal**, soft, clean (slate, black, floor)	3	8

"This mine was opened by J. W. Dwyer in 1914 who operated it until May, 1916; principal office, Rainelle, W. Va.; lease of Meadow River Lumber (Coal and Land) Company; output, 100 tons, 9-hour day; men employed, 25 inside and 5 outside; ship run-of-mine coal only and mostly for steam purposes, both east and west, and gives perfect satisfaction; rises rapidly southeast; J. M. Suttle, Foreman, authority for mine data."

A sample (926H) was collected from No. 3 of the above section by Hennen, the analysis of which is published under **No. 424** in the Table of Coal Analyses at the end of this Chapter.

Low Ash Smokeless Coal Company "Green Siding" Mine—No. 425 on Map II.

Fayette County, Sewell Mountain District; also known as Peck Mine, 1.75 miles northwest of Rainelle, on west bank of western tributary of Meadow River; **No. 6 Pocahontas Coal**; elevation, 2470′ B.

			Ft.	In.
1. Shale, black, **Royal**, pelecypods, concretions			5	0+
2. **Coal**, draw in part, dull to bright	0′	6″		
3. **Coal**, laminated with bright and dull	1	5		
4. **Coal**, columnar	0	8		
5. Fusain (mineral charcoal)	0	0¼		
6. **Coal**	0	1		
7. Fusain (mineral charcoal)	0	0¼		
8. **Coal**, columnar, lumps well	1	2		
9. **Coal**, draw in part	0	4	4	2½

A sample (No. 149PH) was taken from Nos. 2, 3, 4, 5, 6, 7, and 8 of the above section, the analysis of which is published under **No. 425** in the Table of Coal Analyses at the end of this Chapter.

An abandoned opening in the No. 6 (?) Pocahontas Coal was reported near the location of the above mine but on the east bank of the small stream joining Meadow River at Aldrich Camp. The section as shown in the Maywood-Aldrich Camp Section, page 203, of the Fayette Report, is as follows:

	Ft.	In.
Coal, No. 6 Pocahontas, at closed opening (No. 569 on Map II of Fayette County Report) of Meadow Lumber (Coal and Land) Company, reported clean and 48″ thick by W. F. Hall, Superintendent..........	4	0
Interval to Meadow River at Aldrich Camp....................	140	0

As noted above, Hennen reports the abandoned opening as 140 feet above the river at Aldrich Camp. Mine No. 425, however, is only 75 feet above the railroad at Aldrich Camp and not over 100 feet above the river at that point. It would appear that the abandoned opening was probably in the No. 7 Pocahontas Coal.

Gauley Coal Land Company Prospect—No. 426 on Map II.

On northwest side of Meadow Creek, 0.8 mile from mouth; No. 6 Pocahontas Coal; elevation, 2460′ B.

				Ft.	In.
1.	Shale, black, Royal, large pelecypods........................				
2.	Coal, blocky, impure..............	0′	4″		
3.	Coal, banded	1	2		
4.	Coal, hard, bony......................	0	1		
5.	Coal, columnar	1	8		
6.	Coal, banded bright and dull	0	4	3	7
7.	Shale, sandy				

A sample (No. 145PH) was taken from Nos. 2, 3, 4, 5, and 6 of the above section, the analysis of which is published under **No. 426** in the Table of Coal Analyses at the end of this Chapter.

Coal Exposure—No. 427 on Map II.

On south side of Meadow Creek, 0.5 mile from mouth; **No. 6 Pocahontas Coal**, elevation, 2480' B.; section reported by Mr. Wm. McClung.

			Ft.	In.
Coal (shale roof)	2'	1"		
Parting	0	1		
Coal	1	10	4	0

Greenbrier Fire Creek Coal Company "Midland" Mine—No. 428 on Map II.

Same as Midland New Mine, formerly Midland Smokeless Coal Company; 0.8 mile northwest of Charmco, on north side of Meadow River; **No. 6 Pocahontas Coal**; elevation, 2580' B.

	Ft.	In.
Coal, reported	4	0

Post-office address, Charmco; Mine Foreman, Will Lang; on Nicholas, Fayette, and Greenbrier Railroad.

A prospect opening at approximately the same location as the above mine was measured and sampled before the mine was opened. The section measured is as follows:

				Ft.	In.
1.	Shale, black, fossiliferous, **Royal**				
2.	**Coal**, good, laminated with fusain (mineral charcoal)	1'	10"		
3.	Fusain (mineral charcoal)	0	1		
4.	**Coal**, clean, good	1	6		
5.	**Coal**, hard	0	4	3	9

A sample (No. 111PH) was taken from Nos. 2, 3, 4, and 5 of the above section, the analysis of which is published under **No. 428** in the Table of Coal Analyses at the end of this Chapter.

T. E. and S. T. Jones Mine—No. 429 on Map II.

Truck mine, formerly Ed Gratten Mine; on west side of Laurel Creek, 0.35 mile north of Charmco; **No. 6 Pocahontas Coal**; elevation, 2600' B.:

			Ft.	In.
Coal, slightly bony (black shale roof, good)	0'	4"		
Coal, laminated with fusain (mineral charcoal)	0	4		
Fusain (mineral charcoal)	0	0½		
Coal, laminated	0	7		
Coal, hard	1	1		
Coal, soft	1	3		
Coal, hard	0	4	3	11½

A sample (No. 142PH) was taken from the above section, the analysis of which is published under **No. 429** in the Table of Coal Analyses at the end of this Chapter.

Joe Neff Mine No. 1—No. 430 on Map II.

Truck mine, on Snowden Crane property; on west side of Laurel Creek, 0.85 mile north-northeast of Charmco; **No. 6 Pocahontas Coal**; elevation, 2670' B.

			Ft.	In.
Coal, banded, bright and dull, (shale roof)	1'	8"		
Coal, soft, partly columnar	1	4	3	0

A sample (No. 148PH) was taken from the above section, the analysis of which is published under **No. 430** in the Table of Coal Analyses at the end of this Chapter.

Lester Boyer Mine—No. 431 on Map II.

On west side of Laurel Creek, below public road, 1.25 miles northeast of Charmco; **No. 6 Pocahontas Coal**; elevation, 2665' B.

			Ft.	In.
Coal, hard, bony (black shale roof)	0'	1"		
Coal, hard	0	6		
Coal, blocky, but laminated with mineral charcoal	0	10		
Coal, columnar	1	6		
Coal, hard (slate floor)	0	8	3	7

A sample (No. 147PH) was taken from the above section, the analysis of which is published under **No. 431** in the Table of Coal Analyses at the end of this Chapter.

The Gauley Coal Land Company has recently prospected the south end of Mill Creek Mountain. The prospecting was completed too late to be shown on Map II. However, Figure 22 shows the outcrop of the **No. 6 Pocahontas Coal** as shown for this area on Map II to which have been added the approximate locations of the following six openings:

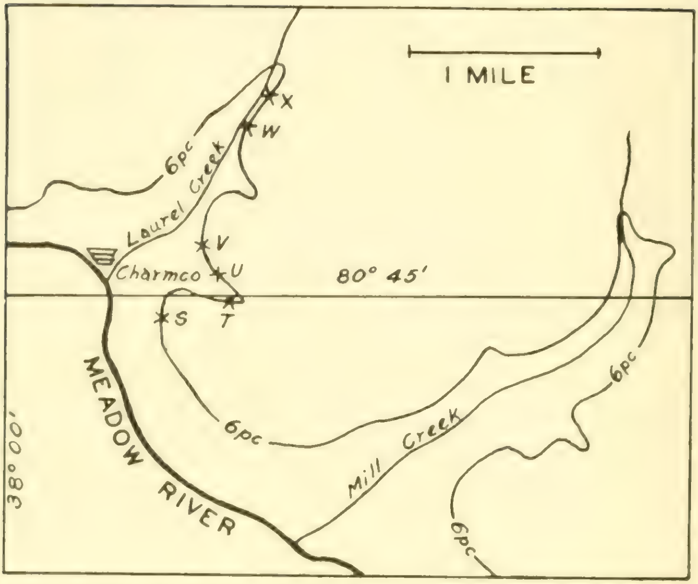


Figure 22.—Map showing the location of recent prospect openings in the No. 6 Pocahontas Coal.

Gauley Coal Land Company Prospect X on Figure 22.

On east side of Laurel Creek, 1.29 miles northeast of mouth; sampled by Gauley Coal Land Company and analyzed by Commercial Testing and Engineering Company, Charleston, W. Va., as reported by the former Company; **No. 6 Pocahontas Coal**; elevation, 2668' L.

	MEASUREMENT TAKEN					
	45 feet in		90 feet in		110 feet in	
Coal	Ft. 4	In. 2	Ft. 4	In. 6	Ft. 4	In. 0
	A. S.	D. B.	A. S.	D. B.	A. S.	D. B.
Analyses	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Moisture	8.54	....	13.23	....	1.04	....
Volatile Matter	24.04	26.28	28.42	32.75	22.65	22.89
Fixed Carbon	64.88	70.94	52.73	60.77	74.05	74.83
Ash	2.54	2.78	5.62	6.48	2.26	2.28
Totals	100.00	100.00	100.00	100.00	100.00	100.00
Sulphur	0.50	0.55	0.46	0.53	0.64	0.65
B. T. U.	12,621	13,799	9,532	10,985	15,237	15,397

Gauley Coal Land Company Prospect W on Figure 22.

On east side of Laurel Creek, 1.05 miles northeast of mouth; sampled by Gauley Coal Land Company and analyzed by Commercial Testing and Engineering Company, Charleston, W. Va., as reported by the former Company; No. 6 Pocahontas Coal; elevation, 2696' L.

	Ft.	In.
Coal	3	$4\frac{1}{2}$

Analysis	As Sampled. Per cent.	Dry Basis. Per cent.
Moisture	1.11	....
Volatile Matter	22.15	22.40
Fixed Carbon	72.81	73.63
Ash	3.93	3.97
Totals	100.00	100.00
Sulphur	0.72	0.73
B. T. U.	14,946	15,114

Gauley Coal Land Company Prospect V on Figure 22.

On east side of Laurel Creek, 0.55 mile northeast of mouth; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 2716' L.

			Ft.	In.
Coal	2'	7"		
Coal and bone	0	4	2	11

Gauley Coal Land Company Prospect U on Figure 22.

On east side of Laurel Creek, 0.55 mile east of mouth; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 2727' L.

			Ft.	In.
Coal	0'	6"		
Bone	0	2		
Coal	1	3	1	11

Gauley Coal Land Company Prospect T on Figure 22.

On south side of east branch of Laurel Creek, 0.55 mile southeast of Charmco; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 2786' L.

			Ft.	In.
Coal	1'	4"		
Laminated	0	2		
Coal	0	2		
Slate	0	1		
Coal	0	10	2	7

Gauley Coal Land Company Prospect S on Figure 22.

On southwest end of Mill Creek Mountain, 0.35 mile southeast of Charmco; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal**; elevation, 2767′ L.

			Ft.	In.
Coal	1′	2½″		
Coal and slate	1	7½	2	10

Gauley Coal Land Company Prospect No. 607—No. 432 on Map II.

On east side of Mill Creek, 2.65 miles east of Charmco and 3.05 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal**; elevation, 2818′ L.

			Ft.	In.
Coal	0′	8″		
Slate	6	0		
Coal	0	6		
Slate	1	8		
Coal (fire clay floor)	2	6	11	4

Gauley Coal Land Company Prospect No. 561—No. 433 on Map II.

On east side of Mill Creek, 2.9 miles east of Charmco and 2.85 miles north of Rupert; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal?**; elevation, 2887′ L.

	Ft.	In.
Coal	1	6

Gauley Coal Land Company Prospect AG—No. 434 on Map II.

On south end of Big Clear Creek Mountain, 2.4 miles southeast of Charmco and 1.55 miles northwest of Rupert; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal?**; elevation, 2955′ L.

	Ft.	In.
Coal and bone	2	2

Gauley Coal Land Company Prospect M—No. 435 on Map II.

On south end of Big Clear Creek Mountain, 1.05 miles northeast of Rupert; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal**; elevation, 3086′ L.

			Ft.	In.
Coal	0′	7″		
Slate	0	1		
Coal	1	2		
Slate	0	2		
Coal (fire clay floor)	2	0	4	0

Gauley Coal Land Company Prospect K—No. 436 on Map II.

On south end of Big Clear Creek Mountain; 0.85 mile northeast of Rupert; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 3144′ L.

			Ft.	In.
Coal and slate	0′	4″		
Coal	1	0		
Bone	0	2		
Coal (fire clay floor)	1	8	3	2

Gauley Coal Land Company Prospect AF—No. 437 on Map II.

On west side of Big Clear Creek, 1.45 miles north of Rupert; used in Big Clear Creek Mountain Section; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 3093′ L.

	Ft.	In.
Coal and bone	2	6

Gauley Coal Land Company Prospect AE—No. 438 on Map II.

On west side of Big Clear Creek, 1.7 miles north of Rupert; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 3100′ L.

	Ft.	In.
Coal and bone	2	0

Gauley Coal Land Company Prospect AD—No. 439 on Map II.

On west side of Big Clear Creek, 1.85 miles north the Rupert; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 3079′ L.

	Ft.	In.
Coal and slate	2	5

Gauley Coal Land Company Prospect AC—No. 440 on Map II.

On west side of Big Clear Creek, 1.95 miles north of Rupert; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 3070′ L.

	Ft.	In.
Coal	1	5

Gauley Coal Land Company Prospect AB—No. 441 on Map II.

On west side of Big Clear Creek, 2.05 miles north of Rupert; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 3060′ L.

	Ft.	In.
Coal and slate	1	5

Gauley Coal Land Company Prospect AA—No. 442 on Map II.

On east side of Big Clear Creek, 3.1 miles north of Rupert; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal; elevation, 3025′ L.

	Ft.	In.
Coal and bone	2	1

Leckie Smokeless Coal Company Prospect—No. 443 on Map II.

On the east side of Brown Creek, 1.15 miles north of its mouth and 1.55 miles northwest of Anjean; No. 6 Pocahontas Coal; elevation, 2860′ B.

	Ft.	In.
Sandstone, conglomerate	5	0
Coal	3	0
Concealed		

Leckie Smokeless Coal Company Prospect—No. 444 on Map II.

On the east side of Pollock Mountain, 3.05 miles southwest of Duo and 1.2 miles north of Anjean; No. 6 Pocahontas Coal?; elevation, 2920′ B.

				Ft.	In.
1.	Sandstone, grayish-brown			15	0
2.	Coal, bright, good	0′	6″		
3.	Shale	0	4		
4.	Coal, clean	0	2½		
5.	Bone	0	4		
6.	Coal, dull to bright	2	10	4	2½
7.	Shale			15	0
8.	Sandstone, irregular bedding			40	0

A sample (No. 151PH) was taken from Nos. 2, 4, and 6 of the above section, the analysis of which is published under No. 444 in the Table of Coal Analyses at the end of this Chapter.

L. E. McClung Prospect—No. 445 on Map II.

On the east side of Big Clear Creek, 2.2 miles southwest of Duo and 2 miles northeast of Anjean; No. 6 Pocahontas Coal?; elevation, 2960′ B. (2940′ L.?).

	Ft.	In.
Coal, reported by L. E. McClung, 3′ 0″ to	4	0

As reported by Gauley Coal Land Company for what appears to be the same location, elevation, 2940′ L.

			Ft.	In.
Coal	1′	5″		
Shale	0	6		
Coal	1	7		
Coal and slate	0	3		
Coal	0	7	4	4

Gauley Coal Land Company Prospect No. 591—No. 446 on Map II.

On the west side of the south end of Shellcamp Ridge, 0.95 mile northeast of Anjean; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal?; elevation, 2955′ L.

			Ft.	In.
Bone	0′	8½″		
Coal	1	7		
Slate	0	2½		
Coal	1	11	4	5

Gauley Coal Land Company Prospect No. 590E—No. 447 on Map II.

On the west side of the south end of Shellcamp Ridge, 0.85 mile northeast of Anjean; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal?; elevation, 2984′ L.

			Ft.	In.
Coal	0′	9″		
Slate	0	5		
Coal	0	3½		
Bone	0	2		
Coal	1	9		
Slate	0	3		
Coal	1	9		
Bone	0	2	5	6½

Gauley Coal Land Company Prospect No. 590B—No. 448 on Map II.

On the east side of the south end of Shellcamp Ridge, 0.65 mile northeast of Anjean; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal?; elevation, 3020′ L.

			Ft.	In.
Coal and slate	1′	10½″		
Coal	3	6½	5	5

Gauley Coal Land Company Prospect No. 590A—No. 449 on Map II.

On the east side of the south end of Shellcamp Ridge, 0.9 mile northeast of Anjean; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal?; elevation, 3005′ L.

			Ft.	In.
Coal	0′	8″		
Sandstone	2	6		
Coal	1	2	4	4

Gauley Coal Land Company Prospect No. 590— No. 450 on Map II.

On the east side of Shellcamp Ridge, 1.9 miles northeast of Anjean and 2.45 miles south of Duo. Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal?**; elevation, 3036′ L.

	Ft.	In.
Slate	0	7
Coal	3	3

Gauley Coal Land Company Prospect No. 1— No. 451 on Map II.

On the west side of Smokehouse Branch, 1 mile north of its mouth and 1.4 miles southeast of Duo; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal?**; elevation, 3164′ L.

	Ft.	In.
Coal (slate roof and floor)	2	10

Gauley Coal Land Company Prospect No. 11— No. 452 on Map II.

On the southwest end of Smokehouse Ridge, 0.3 mile northeast of the mouth of Smokehouse Branch and 2.2 miles southeast of Duo; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal?**; elevation, 3312′ L.

	Ft.	In.
Coal, bone, and slate (slate roof and floor)	8	3

Gauley Coal Land Company Prospect No. 21— No. 453 on Map II.

On Oldhouse Branch, 0.15 mile north of its mouth and 2.5 miles southeast of Duo; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal?**; elevation, 3339′ L.

	Ft.	In.
Coal	3	8

Gauley Coal Land Company Prospect No. A314— No. 454 on Map II.

On the north side of Little Clear Creek Mountain, 0.35 mile southeast of mouth of Old Field Branch; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal?**; elevation, 3434′ L.

	Ft.	In.
Coal	3	11

Gauley Coal Land Company Prospect No. A313— No. 455 on Map II.

On the north side of Little Clear Creek Mountain, 0.55 mile southwest of mouth of Old Field Branch; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal?; elevation, 3451′ L.

			Ft.	In.
Coal	2′	10½″		
Slate	1	0½		
Coal (fire clay floor)	1	1	5	0

A sample of coal was taken at the above location by the Gauley Coal Land Company and analyzed by the Commercial Testing and Engineering Company, of Charleston, W. Va. The analysis as reported by the former company is published under **No. 455** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A312— No. 456 on Map II.

On north side of Little Clear Creek Mountain, 1.2 miles east of mouth of Smokehouse Branch and 0.8 mile southwest of mouth of Old Field Branch; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal?; elevation, 3448′ L.

	Ft.	In.
Coal (fire clay floor)	3	0

Gauley Coal Land Company Prospect No. A405— No. 457 on Map II.

On the north side of Briery Knob, 0.4 mile southeast of mouth of Smokehouse Branch; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal?; elevation, 3300′ L.

	Ft.	In.
Coal	2	6½

Gauley Coal Land Company Prospect No. A403— No. 458 on Map II.

On the south side of Briery Creek, 0.9 mile east of mouth; Gauley Coal Land Company authority for this section; No. 6 Pocahontas Coal?; elevation, 3282′ L.

			Ft.	In.
Coal (slate roof)	0′	7″		
Slate	0	2		
Coal (fire clay floor)	1	9½	2	6½

Gauley Coal Land Company Prospect No. A402—No. 459 on Map II.

On south side of Briery Creek, 0.7 mile southeast of mouth; Gauley Coal Land Company, authority for this section; **No. 6 Pocahontas Coal?**; elevation, 3245′ L.

			Ft.	In.
Coal	0′	6″		
Slate and bone	0	3		
Coal	2	0		
Slate (fire clay floor)	0	2	2	11

Gauley Coal Land Company Prospect No. A401—No. 460 on Map II.

On the north side of Little Clear Creek Mountain, 0.5 mile south of mouth of Briery Creek; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal?**; elevation, 3235′ L.

			Ft.	In.
Coal (slate roof)	0′	8″		
Bone	0	1½		
Coal (fire clay floor)	1	10½	2	8

Coal Exposure—No. 461 on Map II.

On fire road, on south side of Little Clear Creek Mountain, 1.2 miles south of Anjean; used in Little Clear Creek Section; **No. 6 Pocahontas Coal?**; elevation, 3225′ B.

	Ft.	In.
Coal, thickness not determined		

Gauley Coal Land Company Prospect No. A304—No. 462 on Map II.

On the south end of Kuhn Ridge, 1.1 miles north of mouth of Kuhn Branch; Gauley Coal Land Company authority for this section; **No. 6 Pocahontas Coal**; elevation, 3514′ L.

	Ft.	In.
Coal (slate roof)	4	11½
Slate, soft (fire clay floor)	0	2

Gauley Coal Land Company "Hume" Mine (Abandoned)— No. 463 on Map II.

Graham Smokeless Coal Company property; on east side of Point Mountain, south side of Little Clear Creek Mountain, 2 miles northeast of mouth of Kuhn Branch; **No. 6 Pocahontas Coal**; elevation, 3537′ L.

			Ft.	In.
Coal, laminated, bright with fusain (mineral charcoal), (slate roof)	0′	5″		
Coal, good, columnar	2	0		
Coal, gray bands	0	3		
Coal, clean, hard, laminated (slate floor)	1	6	4	2

A sample (No. 129PH) was taken from the above section, the analysis of which is published under **No. 463** in the Table of Coal Analyses at the end of this Chapter.

Gauley Coal Land Company Prospect No. A302— No. 464 on Map II.

Graham Smokeless Coal Company property; on west side of Middle Mountain, east side of Little Clear Creek, 2.15 miles northeast of mouth of Kuhn Branch; **No. 6 Pocahontas Coal**; elevation, 3549′ L.

	Ft.	In.
Coal (slate floor)	4	0

Gauley Coal Land Company Prospect No. A301— No. 465 on Map II.

Graham Smokeless Coal Company property; on west side of Middle Mountain, east side of Little Clear Creek, 2.1 miles northeast of mouth of Kuhn Branch; **No. 6 Pocahontas Coal**; elevation, 3564′ L.

	Ft.	In.
Coal (slate roof and floor)	4	10

No. 6 Pocahontas Coal, Williamsburg and Falling Springs Districts.

In these districts the **No. 6 Pocahontas Coal** is almost entirely unprospected, only two prospects being noted. The bed is believed, however, to attain practically the same development as in Meadow Bluff District. The horizon of this seam, the outcrop of which is delineated on Map II, extends over a greater area than the probable minable area shown on

Figure 21. The descriptions of the prospects, both of which are in Williamsburg District, follow:

Prospect—No. 466 on Map II.

On north end of Buffalo Mountain, 3.65 miles northwest of Williamsburg; No. 6 Pocahontas Coal; elevation, 3570′ B.

		Ft.	In.
Coal (reported by B. M. Higginbotham)		1	8

Gauley Coal Land Company Prospect—No. 467 on Map II.

On the waters of Hogcamp Run, 1.05 miles from its mouth, and 2.15 miles east of Beech Knob; authority, Gauley Coal Land Company; No. 6 Pocahontas Coal; elevation, 3055′ L.

			Ft.	In.
Coal	0′	10″		
Slate	1	3		
Coal	1	4	3	5

Quantity of No. 6 Pocahontas Coal Available.

The following table computed from planimetric measurement of the outcrop of the seam as shown on Map II for the area indicated on Figure 21, page 581, gives the probable amount of **No. 6 Pocahontas Coal** in Greenbrier County. A low figure for the **average** thickness was assumed so that the total would not be too great if local areas prove to be cut out or too thin for mining:

Probable Amount of No. 6 Pocahontas Coal.

District.	Thickness of Coal Assumed, Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal, (2000 Lbs.)
Meadow Bluff	3	81.80	52,352	6,841,359,360	273,654,374
Williamsburg	2	18.45	11,808	1,028,712,960	41,148,518
Falling Springs	2	4.00	2,560	223,027,200	8,921,088
Totals		104.25	66,720	8,093,099,520	323,723,980

NO. 3 POCAHONTAS COAL.

The No. 3 Pocahontas Coal, previously described in Chapter VI, constitutes a small but valuable reserve of coal in Greenbrier County. It is probably the lowest minable bed in the county. In general it is multiple-bedded, soft, columnar, and has been mined locally at a few points. It may reach a total thickness of over five feet but is usually impure when present in that thickness. Chemical analyses reveal an excellent fuel with a low volatile content and high fusion point of the ash.

The extent of the probable minable area of No. 3 Pocahontas Coal is shown on Figure 23. Its interval below No. 6 Pocahontas is approximately 100 feet, so that its position on Map II may be easily interpolated from the position of that seam.

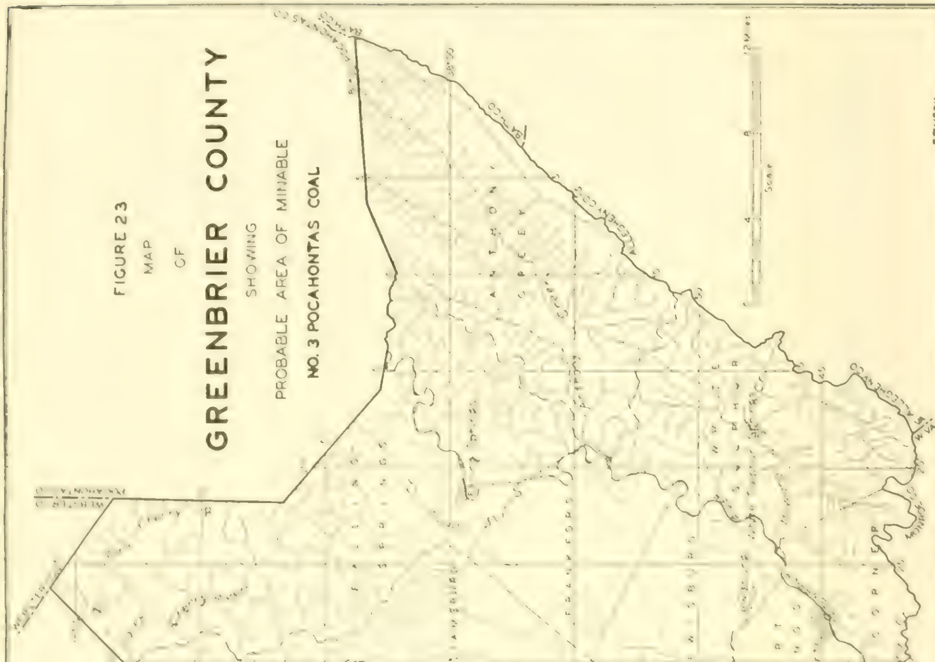


FIGURE 23
MAP
OF
GREENBRIER COUNTY
SHOWING
PROBABLE AREA OF MINABLE
NO. 3 POCAHONTAS COAL

No. 3 Pocahontas Coal, Meadow Bluff District.

The thickness and stratigraphic position of the No. 3 Pocahontas Coal are shown in the Goddard Mountain, Little Clear Creek, Sims Station, Sims School, Big Clear Creek Mountain, Little Sewell Mountain—West Side and Little Sewell Mountain—South End Sections, published in Chapter V. It is also reported in the records of borings Nos. 13, 14, and 15 published in preceding pages of this Chapter.

The description of the prospects and openings noted follows:

Coal Exposure—No. 484 on Map II.

On public road between Sims Station and Boggs Knob, 2.9 miles south of Rainelle; used in Sims Station Section; **No. 3 Pocahontas Coal?**; elevation, 2960′ B.

	Ft.	In.
Coal	0	4

W. H. Sims Mine—No. 485 on Map II.

Local mine, on southeast side of Sims Mountain, 2.25 miles south of Rainelle; used in Sims School Section; **No. 3 Pocahontas Coal**; elevation, 2910′ B.

				Ft.	In.
1.	**Coal**, blocky	0′	9″		
2.	Bone parting	0	2		
3.	**Coal**, blocky, laminated	2	0	2	11
4.	Concealed				

A sample (No. 160PH) was taken from Nos. 1 and 3 of the above section, the analysis of which is published under **No. 485** in the Table of Coal Analyses at the end of this Chapter.

The same opening was visited by Ray V. Hennen who gives the following section under No. 574 on page 854 of the Fayette County Report:

			Ft.	In.
Coal, soft (roof, sandstone, flaggy)	0′	9″		
Bony slate, 0″ to	0	2		
Coal, soft (slate, black, pavement)	2	6	3	5

Hennen correlated this seam with the No. 6 Pocahontas but later work apparently proves it to be No. 3 Pocahontas.

Cyrus Goddard Mine—No. 486 on Map II.

Local mine, on west side of Goddard Mountain, 1.9 miles south of East Rainelle; used in Goddard Mountain Section—West Side; **No. 3 Pocahontas Coal**; elevation, 2890′ B.

			Ft.	In.
1. **Coal** (shale roof)	0′	2″		
2. Shale	0	1		
3. **Coal**	0	1		
4. Shale	0	5		
5. **Coal**	0	1½		
6. Shale	0	2		
7. **Coal**, clean, good (shale floor)	1	5½	2	6

A sample (No. 138PH) was taken from No. 7 of the above section, the analysis of which is published under **No. 486** in the Table of Coal Analyses at the end of this Chapter.

V. F. Eagle Mine—No. 487 on Map II.

Local mine, on the east side of Goddard Mountain, 2.6 miles southeast of East Rainelle and 0.75 mile northwest of Meadowvale School; **No. 3 Pocahontas Coal**; elevation, 3020′ B.

			Ft.	In.
Coal (sandstone roof)	0′	4″		
Shale	1	6		
Coal	1	8	3	6

Coal Opening—No. 488 on Map II.

On west side of Little Sewell Mountain, below public road, 0.9 mile southeast of East Rainelle; used in Little Sewell Mountain Section—West Side; **No. 3 Pocahontas Coal**; elevation, 2780′ B.

	Ft.	In.
Coal, soft, good (shale roof)	2	0

Meadow River Coal and Land Company Prospect—No. 489 on Map II.

On the west side of Little Sewell Mountain, 2.9 miles southeast of Rainelle and 2.3 miles southwest of Rupert; **No. 3 Pocahontas Coal**; elevation, 2960′ B.

			Ft.	In.
Sandstone, brown, medium-grained				
Coal, laminated with fusain (mineral charcoal)	0′	8″		
Coal, hard	0	5		
Coal, banded	1	1		
Coal, hard	0	1		
Coal, banded	1	3	3	6

A sample (No. 137PH) was taken from the above section, the analysis of which is published under **No. 489** in the Table of Coal Analyses at the end of this Chapter.

Meadow River Lumber Company (?) Prospect— No. 490 on Map II.

On west side of Little Sewell Mountain, 3 miles southeast of Rainelle and 2.3 miles southwest of Rupert; **No. 3 Pocahontas Coal**; elevation, 2985′ B.

	Ft.	In.
Coal (sandstone roof) reported 3′ 0″ to	3	6

Coal Exposure—No. 491 on Map II.

On public road, on south end of Little Sewell Mountain, 2.5 miles south of Rupert; used in Little Sewell Mountain Section—South End; **No. 3 Pocahontas Coal**; elevation, 3190′ B.

	Ft.	In.
Coal, exposed	1	0

Coal Exposure—No. 492 on Map II.

On upper side of State highway, 0.4 mile north of Charmco; used in Charmco Section; **No. 3 Pocahontas Coal**; elevation, 2580′ B.

			Ft.	In.
Coal, exposed	0′	1″		
Fire clay	1	9		
Coal, exposed	0	2	2	0

Coal Exposure—No. 493 on Map II.

On public road, on south end of Mill Creek Mountain, 2 miles northwest of Rupert; **No. 3 Pocahontas Coal**; elevation, 2745′ B.

	Ft.	In.
Coal, exposed, 1′ 0″ to	2	0

Coal Exposure—No. 494 on Map II.

On public road, on east side of Big Clear Creek Mountain, 1 mile north of Rupert; used in Big Clear Creek Mountain Section; **No. 3 Pocahontas Coal**; elevation, 3033′ B.

	Ft.	In.
Coal, exposed	1	0

Gauley Coal Land Company Prospect 599—No. 495 on Map II.

On west side of Big Clear Creek, 1.7 miles north of Rupert; No. 3 Pocahontas Coal; elevation, 3019′ L.

			Ft.	In.
Coal (sandstone roof)	0′	8″		
Bone	0	3		
Coal (fire clay floor)	1	10	2	9

Gauley Coal Land Company Prospect 598—No. 496 on Map II.

On west side of Big Clear Creek, 1.85 miles north of Rupert; No. 3 Pocahontas Coal; elevation, 2989′ L.

			Ft.	In.
Coal (sandstone roof)	0′	6″		
Sandstone	3	8		
Coal	0	8		
Slate	0	3½		
Coal	1	9		
Slate	0	0½		
Coal (fire clay floor)	0	5	7	4

Gauley Coal Land Company Prospect 597A—No. 497 on Map II.

On west side of Big Clear Creek, 3 miles north of Rupert; No. 3 Pocahontas Coal; elevation, 2930′ L.

	Ft.	In.
Coal (sandstone roof; fire clay floor)	3	2

Coal Exposure—No. 498 on Map II.

Along road, on south side of Little Clear Creek Mountain, 1.2 miles south of Anjean; used in Little Clear Creek Section; No. 3 Pocahontas Coal; elevation, 3125′ B.

	Ft.	In.
Coal, badly weathered, exposed	4	0

No. 3 Pocahontas Coal, Williamsburg District.

The following is the only exposure noted in Williamsburg District:

Coal Exposure—No. 499 on Map II.

On Cold Knob road, 0.8 mile north of Cold Knob and 0.9 mile northeast of Grassy Knob; No. 3 Pocahontas Coal; elevation, 4055′ B.

	Ft.	In.
Coal, thickness not determined		

Quantity of No. 3 Pocahontas Coal Available.

The following table, giving the estimated tonnage of No. 3 Pocahontas Coal in Greenbrier County, has been computed from planimetric measurement of the outcrop as drawn on work sheets for the area indicated on Figure 23, page 602. A low figure for the **average** thickness was assumed so that the total would not be too great if local areas prove to be cut out or too thin for mining:

Probable Amount of No. 3 Pocahontas Coal.

District.	Thickness of Coal Assumed. Feet.	Square Miles.	Acres.	Cubic Feet of Coal.	Short Tons of Coal. (2000 lbs.)
Meadow Bluff	2	20.5	13,120	1,143,014,400	45,720,576
Williamsburg	2	0.4	256	22,302,720	892,109
Totals	2	20.9	13,376	1,165,317,120	46,612,685

SUMMARY OF AVAILABLE COAL.

On preceding pages of this Chapter there is given at the end of the description of each of the six minable coal beds an estimate of the available tonnage of each by magisterial districts along with the total for the county. The following table, with coals arranged in descending order, gives a summary of these statements:

Summary of Available Coal by Districts in Greenbrier County (in tons of 2,000 pounds).

Coal Seam.	Mine and Prospect Numbers shown on Map II and Described in Chapter XI.	Meadow Bluff District.	Williamsburg District.	Falling Springs District.	Totals.
Sewell	10-230	151,602,738	22,693,016	41,483,059	215,778,813
Little Raleigh	231-257	59,102,208	23,417,856		82,520,064
Beckley	258-309	79,174,656	25,871,155	3,345,408	108,391,219
Fire Creek	310-370	312,795,648	49,065,984	81,404,928	443,266,560
No. 6 Pocahontas	408-467	273,654,374	41,148,518	8,921,088	323,723,980
No. 3 Pocahontas	484-499	45,720,576	892,109		46,612,685
Totals		922,050,200	163,088,638	135,154,483	1,220,293,321

The above summary is believed to represent approximately the amount of minable coal that was available before commercial operations were begun in the County some thirty years ago. The table at the beginning of the Chapter shows that a total of 22,823,238 short tons of coal has been mined in Greenbrier previous to December 31, 1936. The amount of coal left in ribs and pillars that will probably never be recovered may increase this total to 28,000,000 tons in round figures, which sum should be deducted from the total in the above summary. The amount of coal available after making this deduction is, in round numbers, 1,192,000,000 short tons, assuming an average recovery of 80 per cent., which appears conservative under modern mining methods, and the probable amount of coal that should eventually be recovered in Greenbrier County, is, in round numbers, 953,600,000 short tons.

TABLE OF COAL ANALYSES.

On the following pages are published the analyses of coal samples collected from mines, prospects, and cores in or near Greenbrier County. With the exception of Nos. C6, C7, C8,

C11, 278, 289, 328, 330, 351, 356, 359, 360, and 455, the analyses were made in the laboratory of the Survey, being mainly the work of Homer A. Hoskins and B. B. Kaplan. The analyses of the samples listed above were reported to the Survey, by the coal operators, and the analytical work, in each case, was done by the Commercial Testing and Engineering Company, of Charleston, W. Va. Seven analyses by the same company have been published on preceding pages.

All analyses made in the Survey laboratories were made in strict accordance with the procedure given in the U. S. Bureau of Mines Technical Paper No. 8, except in one respect, namely, moisture on the ground sample was given off in a Freas Drying Oven at a temperature of 110 degrees Centigrade. In this connection it should be noted that a considerable lapse of time, amounting in some instances to more than a year, occurred between the sampling and analyzing of the coals. In some of the samples there has been an apparent loss of moisture in storage.

Concerning the softening temperature of the ash, Hoskins makes the following statement:

"Coal was ashed and made into cones with a 10% dextrin binder, mounted on alundum placques and heated to various temperatures in a Denver Fire Clay Fusion Furnace. The temperatures inside this furnace were obtained by means of a Leeds and Northrup pyrometer which had been recently calibrated.

"The initial softening point was read as the temperature at which the ash cone began to deform whether by bending or sloughing. The fusion point was read as the temperature at which the cone formed a sphere, and the temperature at which this sphere melted and flowed out flat was taken as the melting point of the ash."

In the left-hand column is given the number of the sample corresponding to that shown on Map II and used to designate the mine, opening or core in the description published on a preceding page. The second column from the left gives the laboratory or sample number, with the letters indicating the identity of the collector. In that column PH=Price, R=David B. Reger, and H=Ray V. Hennen. The column headed "Mine, Prospect or Core" is self explanatory. In the fourth column from the right is given the key to the analyst by the following: HAH=Homer A. Hoskins, BBK=B. B. Kaplan, JBK=J. B. Krak, and CTE=Commercial Testing and Engineering Com-

pany, of Charleston, W. Va. Under the heading "Carbon Ratio," the fixed carbon has been calculated on the "moisture —ash free" basis and on the moisture—mineral matter—free basis. The formulas used are:

$$\text{Fixed Carbon} \times \frac{100}{100-(\text{moisture}+\text{ash})} = \text{dry moisture—ash—free fixed carbon.}$$

$$\text{Fixed Carbon} \times \frac{100}{100-(\text{moisture}+1.1\times\text{ash})} = \text{dry mineral matter—free fixed carbon.}$$

The second formula is that proposed by A. C. Fieldner, W. A. Selvig, and W. H. Frederic in, "Classification Chart of Typical Coals of the United States," U. S. Bureau of Mines Report of Investigations 3296, December, 1935. According to the classification chart given in the above-named paper, part of the coal of Greenbrier County would be "Medium-volatile bituminous coal" and part "Low-volatile bituminous coal."

The column on the right gives the page reference to the description of the mine or prospect sampled.

All of the Survey samples are "channel cuts" of the mining sections of the seams, unless otherwise described, the usual method being to discard from the samples such slates or other impurities as would be rejected in ordinary commercial shipment.

The following abbreviations were used under "Coal Seam and Name of Mine or Prospect":

Greenbrier Sm. Coal Co..........Greenbrier Smokeless Coal Company.
Imperial Sm. Coal Co..............Imperial Smokeless Coal Company.
N. R. & P. Cons. Coal Co.........New River and Pocahontas Consolidated Coal Company.
Leckie Sm. Coal Co................Leckie Smokeless Coal Company.
Low Ash Sm. Coal Co.............Low Ash Smokeless Coal Company.
Gauley C. L. C.........................Gauley Coal Land Company.

Table of Coal Analyses.

(Under "Condition of Sample", "AD" = air dried; "AR" = as received; "DB" = dry basis).

No. on Map II.	Sample Number.	Mine Prospect or Core.	Coal Seam and Name of Mine or Prospect.	Condition of Sample.	Proximate. Moisture Lost on Air Drying.	Moisture.	Volatile Matter.	Fixed Carbon.	Ash.	Sulphur.	Calorimeter B. T. U. for 1 lb. of Coal.	Softening Temperature of Ash. Degrees F. Initial Softening.	Fusion.	Melting.	Analyst.	Carbon Ratio. M. & A. Free.	M. & M. M. Free.	Page.
			Sewell Coal															
16	158PH	M	Haines (J. C. Dixon)	AD	1.52	0.56	25.14	68.71	5.59	0.62	14,600	2,300	2,965		HAH	73.21	73.65	476
16	158PH	M	Haines (J. C. Dixon)	AR		2.07	24.76	67.66	5.51	0.61	14,350	2,300	2,965		HAH	73.21	73.65	476
18	159PH	M	H. J. & W. A. Pitzenbarger	AD	3.48	0.73	24.36	68.34	6.57	0.82	14,390	2,110	2,695	2,772	HAH	73.72	74.25	477
18	159PH	M	H. J. & W. A. Pitzenbarger	AR		4.18	23.51	65.97	6.34	0.79	13,886	2,110	2,695	2,772	HAH	73.72	74.25	477
25	90PH	M	Greenbrier Sm. Coal Co. No. 1	AD		0.41	26.64	70.82	2.13	0.83	14,977		2,100		BBK	72.67	72.82	479
25	91PH	M	Greenbrier Sm. Coal Co. No. 2	AD		0.56	26.14	70.51	2.79	1.03	14,924		2,060		BBK	72.95	73.17	479
28	89PH	M	Crichton	AD		0.41	27.27	69.10	3.22	1.24	14,943		2,023		BBK	71.70	71.94	480
28	88PH	M	Crichton	AD	0.14	0.63	26.49	70.24	2.64	1.08	14,900		2,023		BBK	72.61	72.81	480
31	81PH	M	Imperial Sm. Coal Co. No. 1	AD		0.32	26.77	69.69	3.22	1.06	14,701		2,100		BBK	72.25	72.49	481
31	83PH	M	Imperial Sm. Coal Co. No. 1	AD	0.26	0.22	25.05	71.97	2.76	0.80	14,919		1,935		BBK	74.18	74.39	481
33	82PH	M	Imperial Sm. Coal Co. No. 2	AD	0.06	0.63	26.38	70.34	2.65	0.84	14,777		2,200		BBK	72.73	72.93	483
34	86PH	M	Frances	AD	0.11	0.35	26.70	69.12	3.83	0.88	14,774		2,023		BBK	72.14	72.42	483
38	84PH	M	Margarette No. 2	AD	0.11	0.24	25.97	70.41	3.38	1.19	14,744		2,100		BBK	73.05	73.31	484
40	85PH	M	Margarette No. 1	AD	0.18	1.12	25.06	71.48	2.34	0.78	14,749		2,222		BBK	74.04	74.22	485
43	96PH	M	N. R. & P. Cons. Coal Co. No. 3	AD		0.44	25.13	71.91	2.52	0.89	14,812		2,286		HAH	74.10	74.30	486
46	92PH	M	N. R. & P. Cons. Coal Co. No. 1	AD		0.51	25.09	71.63	2.77	1.08	14,874		2,110		BBK	74.06	74.27	487
51	157PH	M	Joe Neff	AD	3.23	0.60	24.48	71.19	3.73	1.51	14,890	1,975	2,150	2,459	HAH	74.41	74.70	488
51	157PH	M	Joe Neff	AR		3.81	23.74	69.73	2.72	1.46	14,440	1,975	2,150	2,459	HAH	74.60	74.82	488
54	93PH	M	N. R. & P. Cons. Coal Co. No. 4	AD		0.44	24.68	72.28	2.60	0.90	14,902		2,166		HAH	74.55	74.75	489
54	94PH	M	N. R. & P. Cons. Coal Co. No. 4	AD		0.66	26.00	71.30	2.04	0.75	15,173		2,350		HAH	73.28	73.43	489
54	95PH	M	N. R. & P. Cons. Coal Co. No. 4	AD	1.15	2.15	24.31	70.91	2.63	0.85	14,930		2,286		HAH	74.47	74.68	489
54	95PH	M	N. R. & P. Cons. Coal Co. No. 4	AR		3.28	24.03	70.09	2.60	0.84	14,758		2,286		HAH	74.47	74.68	489
95	80PH	M	Leckie Sm. Coal. Co. No. 2	AD	0.28	0.63	26.36	67.97	5.04	1.40	14,639		2,100		BBK	72.06	72.44	498
143	78A-PH	P	Clear Creek Coal Co. U. Bench	AD		0.63	26.64	68.57	4.16	0.92	14,435		2,023		BBK	72.02	72.34	509
143	78B-PH	P	Clear Creek Coal Co. L. Bench	AD	0.07	0.30	25.63	66.45	7.62	0.59	14,196		2,431		BBK	72.17	72.77	509

Table of Coal Analyses—(Continued).

(Under "Condition of Sample", "AD" = air dried; "AR" = as received; "DB" = dry basis).

No. on Map II	Sample Number	Mine, Prospect or Coke	Coal Seam and Name of Mine or Prospect	Condition of Sample	Proximate: Moisture Loss on Air Drying	Proximate: Moisture	Proximate: Volatile Matter	Proximate: Fixed Carbon	Ash	Sulphur	Calorimeter B. T. U. per 1 lb. of Coal	Softening Temperature of Ash, Degrees F: Initial Deformation	Softening Temperature of Ash, Degrees F: Fusion	Softening Temperature of Ash, Degrees F: Melting	Analyst	Carbon Ratio: M. & A. Dev.	Carbon Ratio: M. & M. M. Fire	Page
			Sewell Coal															
144	77PH	M	[illegible] Coal Co.	AD	......	0.61	28.05	67.60	3.74	1.15	14,526	2,050	2,368	2,575	HAH	70.67	70.95	509
150	79PH	P	Raine Lumber and Coal Co.	AD	0.60	0.85	26.14	70.40	2.61	0.96	14,827	......	2,100	......	BBK	72.90	73.09	511
151	1[illegible]PH	M	Raine Lumber and Coal Co.	AD	2.84	0.74	25.84	69.62	3.80	1.29	14,919	1,903	2,361	2,435	HAH	72.93	73.22	511
151	1[illegible]PH	M	Raine Lumber and Coal Co.	AR	......	3.56	25.10	67.65	3.69	1.22	14,490	1,903	2,361	2,435	HAH	72.94	73.23	511
C-9	01379	C	Raine Lumber and Coal Co.	DB	......	......	25.03	70.46	4.51	0.99	14,800	......	2,623	......	CII	73.67	74.14	167
152	112PH	P	Raine Lumber and Coal Co.	AD	2.58	0.75	25.47	69.32	4.46	1.14	14,690	2,126	2,423	2,527	HAH	73.11	73.46	512
152	112PH	P	Raine Lumber and Coal Co.	AR	......	3.29	24.86	67.51	4.34	1.11	14,108	2,126	2,423	2,527	HAH	73.09	73.43	512
164	114PH	P	Raine Lumber and Coal Co.	AD	3.88	0.93	27.51	68.48	3.08	1.04	14,570	1,995	2,272	2,515	HAH	71.34	71.57	512
164	114PH	P	Raine Lumber and Coal Co.	AR	......	4.77	26.44	65.83	2.96	1.00	14,000	1,995	2,272	2,515	HAH	71.34	71.57	512
C-7	01478	C	Raine Lumber and Coal Co.	DB	......	......	25.[illegible]	71.27	3.[illegible]	1.25	14,775	......	2,326	......	CTE	73.70	73.95	160
C-8	01480	C	Raine Lumber and Coal Co.	DB	......	......	25.80	70.55	3.65	0.99	14,917	......	2,463	......	CIE	73.22	73.50	400
157	85PR	M	[illegible] H[illegible]	AR	......	0.71	27.53	69.44	2.32	0.84	15,310	......	......	......	JBK	71.51	71.68	518
214	185PH	P	Raine Lumber and Coal Co.	AD	4.44	0.93	26.54	70.37	2.16	1.01	15,167	1,935	2,385	2,527	HAH	72.61	72.78	524
214	185PH	P	Raine Lumber and Coal Co.	AR	......	5.33	25.36	67.25	2.06	0.99	14,494	1,935	2,385	2,527	HAH	72.62	72.78	524
219	1[illegible]PH	P	Raine Lumber and Coal Co.	AD	3.35	0.50	27.92	67.94	3.64	0.75	14,300	2,272	2,390	2,650	HAH	70.87	71.14	524
219	1[illegible]PH	P	Raine Lumber and Coal Co.	AR	......	3.84	26.98	65.66	3.52	0.71	13,820	2,272	2,390	2,650	HAH	70.88	71.15	524
C-11	01477	C	Raine Lumber and Coal Co.	DB	......	......	25.57	67.65	6.78	0.97	14,588	......	2,979	......	CTE	72.57	73.16	172
222	37[illegible]R	P	John A. B[illegible]	AR	......	1.06	28.80	68.05	2.09	0.70	......	......	......	......	JBK	70.26	70.49	525
225	165PH	M	[illegible] Coal Co.	AR	......	1.01	30.60	64.95	3.44	1.65	15,100	2,264	2,750	2,783	HAH	67.97	68.22	525
227	211R	M	[illegible] Coal Co.	AR	......	0.63	26.96	66.77	5.64	0.69	......	......	......	......	JBK	71.24	71.67	525
240	62PH	M	[illegible]	AR	......	1.50	23.24	63.36	11.90	0.62	12,213	......	2,850	......	BBK	73.10	74.18	528
			Average (Sewell)	AD	1.57	0.64	25.99	69.88	3.49	0.98	14,758	2,074	2,236	2,569	......	72.87	73.16	......
			Average (Sewell)	AR	......	2.79	25.86	67.13	4.22	0.95	14,247	2,098	2,198	2,585	......	72.22	72.52	......
			Average (Sewell)	DB	......	......	25.46	69.98	4.56	1.63	......	......	2,598	......	......	73.31	73.68	......

Table of Coal Analyses—(Continued).

(Under "Condition of Sample", "AD" = air dried; "AR" = as received; "DB" = dry basis).

No. on Map II.	Sample Number.	Mine Prospect or Core.	Coal Seam and Name of Mine or Prospect	Condition of Sample.	Proximate. Moisture Lost on Air Drying.	Proximate. Moisture.	Proximate. Volatile Matter.	Proximate. Fixed Carbon.	Ash.	Sulphur.	Calorimeter B. T. U. for 1 lb. of Coal.	Softening Temperature of Ash. Degrees F. Initial Softening.	Softening Temperature of Ash. Degrees F. Fusion.	Softening Temperature of Ash. Degrees F. Melting.	Analyst.	Carbon Ratio. M. & A. Free.	Carbon Ratio. M. & M. M. Free.	Page.
			Beckley Coal															
258	150PH	M	Tuck Brothers	AD	1.67	0.35	23.65	69.79	6.21	1.53	14,718	1,925	2,445	2,527	HAH	74.69	75.19	540
258	150PH	M	Tuck Brothers	AR	....	2.01	23.24	68.64	6.11	1.50	14,470	1,925	2,445	2,527	HAH	74.71	75.21	540
278	40679	P	Gauley Coal Land Co. No. A126	DB	....	....	25.74	69.43	4.83	1.00	14,473	....	2,398	....	CTE	72.95	73.33	544
278	40679	P	Gauley Coal Land Co. No. A126	AR	....	2.69	25.05	67.56	4.70	0.97	14,084	....	2,398	....	CTE	72.95	73.32	544
289	40675	P	Gauley Coal Land Co. No. A118	DB	....	....	25.87	62.72	11.41	0.90	....	....	....	....	CTE	70.80	71.72	548
289	40675	P	Gauley Coal Land Co. No. A118	AR	....	5.75	24.38	59.12	10.75	0.85	....	....	....	....	CTE	70.80	71.73	548
			Average (Beckley)	AD	1.67	0.35	23.65	69.79	6.21	1.53	14,718	1,925	2,445	2,527	....	74.69	75.19	....
			Average (Beckley)	AR	....	3.48	24.22	65.11	7.19	1.11	14,277	1,925	2,422	2,527	....	72.82	73.48	....
			Average (Beckley)	DB	....	....	25.80	66.08	8.12	0.95	14,473	....	2,398	....	....	71.88	72.56	....
			Fire Creek Coal															
311	144PH	M	L. E. McClung Midland No. 1	AD	2.19	0.48	21.74	68.63	9.15	0.92	13,850	2,295	2,915	....	HAH	75.94	76.72	557
311	144PH	M	L. E. McClung Midland No. 1	AR	....	2.66	21.26	67.13	8.95	0.89	13,550	2,295	2,915	....	HAH	75.95	76.72	557
312	143PH	M	L. E. McClung Midland No. 2	AD	3.00	0.48	25.14	71.67	2.71	0.71	15,220	2,244	2,915	....	HAH	74.03	74.24	557
312	143PH	M	L. E. McClung Midland No. 2	AR	....	3.47	24.38	69.52	2.63	0.69	14,760	2,244	2,915	....	HAH	74.04	74.24	557
328	40681	P	Gauley Coal Land Co. No. A321	DB	....	....	26.03	68.05	5.92	0.68	13,909	....	2,437	....	CTE	72.33	72.79	561
328	40681	P	Gauley Coal Land Co. No. A321	AR	....	6.47	24.35	63.64	5.54	0.64	13,009	....	2,437	....	CTE	72.33	72.78	561
330	40680	P	Gauley Coal Land Co. No. A319	DB	....	....	25.90	67.48	6.62	0.89	....	....	....	....	CTE	72.26	72.77	561
330	40680	P	Gauley Coal Land Co. No. A319	AR	....	2.59	25.23	65.73	6.45	0.87	....	....	....	....	CTE	72.26	72.78	561
351	40674	P	Gauley Coal Land Co. No. A217	DB	....	....	24.13	63.69	12.18	0.56	....	....	....	....	CTE	72.52	73.54	566
351	40674	P	Gauley Coal Land Co. No. A217	AR	....	2.05	23.64	62.38	11.93	0.55	....	....	....	....	CTE	72.52	73.54	566
356	40673	P	Gauley Coal Land Co. No. A212	DB	....	....	23.79	67.96	8.25	0.56	13,948	....	2,897	....	CTE	74.07	74.74	567
356	40673	P	Gauley Coal Land Co. No. A212	AR	....	2.79	23.13	66.06	8.02	0.54	13,559	....	2,897	....	CTE	74.07	74.74	567
359	40676	P	Gauley Coal Land Co. No. A209	DB	....	....	24.95	69.08	5.97	0.58	....	....	....	....	CTE	73.47	73.94	568

Table of Coal Analyses—(Continued).

(Under "Condition of Sample", "AD" = air dried; "AR" = as received; "DB" = dry basis).

Lab. or Mine No.	Sample No.	M or P	Coal Seam and Name of Mine or Prospect	Condition of Sample	Proximate: Moisture Lost Air Drying	Proximate: Moisture	Proximate: Volatile Matter	Proximate: Fixed Carbon	Ash	Sulphur	Calorimeter B.T.U. per 1 lb. of Coal	Softening Temperature of Ash Degrees F: Initial Softening	Softening Temperature of Ash Degrees F: Fusion	Softening Temperature of Ash Degrees F: Melting	Analyst	Carbon Ratio: M & A Free	Carbon Ratio: M A & M Free	Page
			Fire Creek Coal															
[illegible]	[illegible]	P	[illegible]	AR	......	2.73	24.27	67.19	5.81	0.56	......	......	......	......	CTE	73.46	73.93	568
[illegible]	[illegible]	P	[illegible]	DB	......	......	24.64	66.04	9.32	0.55	13,350	......	2,796	......	CTF	72.83	73.58	569
[illegible]	[illegible]	P	[illegible]	AR	......	3.57	23.70	[illegible]	8.69	0.53	12,860	......	2,796	......	CTF	72.83	73.58	569
[illegible]	162PH	P	[illegible]	AR	......	2.14	24.42	70.50	2.94	0.90	14,509	2,110	2,314	[illegible]	HAH	74.27	74.50	571
			Average (Fire Creek)	AD	1.00	0.48	25.44	71.15	5.93	0.82	14,535	2,270	2,915	......	......	74.99	75.43	......
			Average (Fire Creek)	AR	......	2.16	23.83	66.20	6.81	0.69	13,766	2,216	[illegible]	[illegible]	......	73.53	74.09	......
			Average (Fire Creek)	DB	......	......	24.91	67.05	8.04	0.61	13,731	......	2,710	......	......	72.91	73.56	......
			Little Fire Creek Coal															
571	87PH	M	[illegible]	AD	0.67	0.22	23.18	72.70	3.90	0.75	14,725	......	2,450[1]	......	BBK	75.82	75.87	239
571	[illegible]	M	[illegible]	AR	......	0.38	23.51	74.49	1.62	0.66	15,470	......	......	......	JBK	76.01	76.14	239
574	134PH	M	[illegible]	AD	3.17	0.60	21.05	69.34	8.99	0.65	14,000	2,417	2,945	......	HAH	76.71	77.48	240
574	134PH	M	[illegible]	AR	......	3.84	20.38	67.14	8.64	0.55	13,556	2,417	2,945	......	HAH	76.71	77.48	240
			Average (Little Fire Creek)	AD	1.62	0.46	22.12	71.01	6.41	0.70	14,363	2,417	2,698	......	......	76.27	76.78	......
			Average (Little Fire Creek)	AR	......	2.11	21.95	70.81	5.13	0.61	14,515	2,417	2,945	......	......	76.36	76.70	......
			No. 7 Pocahontas Coal.															
581	144PH	M	[illegible]	AD	5.20	1.76	20.73	69.83	7.68	0.63	13,700	1,925	2,190	2,250	HAH	77.11	77.77	574
581	144PH	M	[illegible]	AR	......	6.87	19.65	66.20	7.28	0.60	13,000	1,925	2,190	2,250	HAH	77.11	77.77	574
[illegible]	146PH	M	E. H. [illegible]	AD	2.1	0.32	20.31	73.37	6.00	1.65	14,653	2,085	2,349	2,473	HAH	78.32	78.82	575
[illegible]	146PH	M	E. H. [illegible]	AR	......	2.46	19.87	71.80	5.87	1.62	14,340	2,085	2,349	2,473	HAH	78.32	78.83	575
584	[illegible]	M	Meadow River Coal and Land Co.	AD	3.58	0.95	23.14	69.71	6.20	1.01	14,329	2,587	2,827	......	HAH	75.08	75.58	575
584	[illegible]	M	Meadow River Coal and Land Co.	AR	......	4.50	22.31	67.21	5.98	0.97	13,816	2,587	2,827	......	HAH	75.08	75.58	575
			Average (No. 7 Pocahontas)	AD	3.64	1.01	21.39	70.97	6.63	1.10	14,227	2,199	2,455	2,362	......	76.84	77.40	......
			Average (No. 7 Pocahontas)	AR	......	4.61	20.61	68.40	6.38	1.06	13,719	2,197	2,455	2,362	......	76.84	77.40	......

Table of Coal Analyses—(Continued).

(Under "Condition of Sample", "AD" = air dried; "AR" = as received; "DB" = dry basis).

No. on Map II.	Sample Number.	Mine Prospect or Core.	Coal Seam and Name of Mine or Prospect.	Condition of Sample.	Proximate.				Ash.	Sulphur.	Calorimeter B. T. U. for 1 lb. of Coal.	Softening Temperature of Ash. Degrees F.			Analyst.	Carbon Ratio.		Page.
					Moisture Lost on Air Drying.	Moisture.	Volatile Matter.	Fixed Carbon.				Initial Softening.	Fusion.	Melting.		M. & A. Free.	M. & M. M. Free.	
			No. 6 Pocahontas Coal															
411	132PH	M	Geo. Shawver	AD	4.01	0.17	16.99	76.66	6.18	0.93	14,630	2,214	2,805	2,860	HAH	81.86	82.40	582
411	132PH	M	Geo. Shawver	AR	....	4.17	16.31	73.59	5.93	0.89	14,095	2,214	2,805	2,860	HAH	81.86	82.40	582
412	133PH	M	Bert Hutsonpillar	AD	3.48	0.30	18.29	76.97	4.44	0.79	14,970	2,126	2,647	2,794	HAH	80.80	81.18	583
412	133PH	M	Bert Hutsonpillar	AR	....	3.77	17.65	74.29	4.29	0.76	14,520	2,126	2,647	2,794	HAH	80.83	81.18	583
413	131PH	M	J. A. & S. J. Wooldridge	AD	2.93	0.17	18.79	76.82	4.22	1.21	14,908	2,059	2,539	2,728	HAH	80.34	80.70	583
413	131PH	M	J. A. & S. J. Wooldridge	AR	....	3.10	18.23	74.57	4.10	1.17	14,480	2,059	2,539	2,728	HAH	80.36	80.71	583
417	130PH	M	Meadow River Fuel Co	AD	3.05	0.26	27.48	66.84	5.42	1.25	14,810	2,243	2,575	2,695	HAH	70.87	71.27	584
417	130PH	M	Meadow River Fuel Co	AR	....	3.30	26.64	64.81	5.25	1.25	14,358	2,243	2,575	2,695	HAH	70.87	71.28	584
423	139PH	M	Meadow River Coal and Land Co	AD	5.35	0.60	20.10	76.65	2.65	0.55	15,067	2,214	2,935	....	HAH	79.22	79.44	585
423	139PH	M	Meadow River Coal and Land Co	AR	....	5.92	19.02	72.55	2.51	0.52	14,256	2,214	2,935	....	HAH	79.23	79.45	585
424	926H	M	Meadow River Smokeless Coal Co	AR	....	0.32	21.60	74.61	3.47	0.54	15,210	....	....	....	JBK	77.55	77.83	586
425	149PH	M	Low Ash Sm. Coal Co. (Peck)	AD	1.81	0.36	24.00	72.25	3.39	0.62	15,120	2,134	2,838	....	HAH	75.06	75.33	586
425	149PH	M	Low Ash Sm. Coal Co. (Peck)	AR	....	2.16	23.56	70.95	3.33	0.61	14,850	2,134	2,838	....	HAH	75.07	75.34	586
426	145PH	P	Gauley Coal Land Co	AD	2.49	0.49	22.40	71.86	5.25	0.94	14,830	2,575	2,728	2,816	HAH	76.24	76.66	587
426	145PH	P	Gauley Coal Land Co	AR	....	2.97	21.84	70.07	5.12	0.92	14,460	2,575	2,728	2,816	HAH	76.24	76.66	587
428	141PH	P	L. E. McClung	AD	2.88	0.20	23.35	74.38	2.07	0.75	15,460	2,431	2,695	....	HAH	76.11	76.27	588
428	141PH	P	L. E. McClung	AR	....	3.07	22.68	72.24	2.01	0.73	15,015	2,431	2,695	....	HAH	76.11	76.27	588
429	142PH	M	T. E. & S. T. Jones	AD	8.18	1.11	25.10	69.82	3.97	0.60	14,140	1,914	2,198	2,587	HAH	73.56	73.87	588
429	142PH	M	T. E. & S. T. Jones	AR	....	9.20	23.05	64.10	3.65	0.55	12,983	1,914	2,198	2,587	HAH	73.55	73.86	588
430	148PH	M	Joe Neff	AD	4.06	0.62	22.68	73.10	3.60	0.60	15,126	2,389	2,587	2,761	HAH	76.32	76.61	589
430	148PH	M	Joe Neff	AR	....	4.65	21.77	70.13	3.45	0.58	14,512	2,389	2,587	2,761	HAH	76.31	76.60	589
431	147PH	M	Lester Boyer	AD	2.34	0.39	26.34	69.60	3.67	0.79	15,620	2,278	2,893	....	HAH	72.55	72.82	589
431	147PH	M	Lester Boyer	AR	....	2.72	25.72	67.98	3.58	0.77	15,240	2,278	2,893	....	HAH	72.55	72.83	589
444	151PH	P	Leckie Smokeless Coal Company	AD	2.05	0.40	25.18	65.51	8.91	1.36	14,220	2,126	2,635	2,750	HAH	72.24	72.95	594

Table of Coal Analyses—(Continued).

(Under "Condition of Sample", "AD" = air dried; "AR" = as received, "DB" = dry basis).

Lab. No.	Sample Symbol	Kind of Sample	Coal Seam and Name of Mine or Prospect.	Condition of Sample	Moisture Loss on Air Drying	Proximate: Moisture	Proximate: Volatile Matter	Proximate: Fixed Carbon	Ash	Sulphur	Calorific Value B.T.U.	Softening Temperature of Ash Degrees F: Initial	Softening	Fluid	Analyst	Carbon Ratio: F.C. ÷ (F.C. + V.M.)	Carbon Ratio: F.C. + V.M.	Page
			No. 6 Pocahontas Coal.															
444	154PH	P	[illegible] Smokeless Coal Company	AR	......	2.44	24.67	64.16	8.73	1.33	13,936	2,126	2,655	2,750	HAH	72.98	72.94	594
4AA	39075	P	[illegible] Coal Land Co. No. A31	AR	......	10.20	25.17	56.43	8.20	0.40	......	......	......	......	CTF	69.15	69.86	597
4AA	39075	P	[illegible] Coal Land Co. No. A31	DB	......	......	28.03	62.84	9.13	0.44	......	......	......	......	CTL	69.15	69.86	597
[illegible]	[illegible]PH	M	[illegible] C. L. C. (Home Opening)	AD	2.71	0.27	22.35	70.81	6.57	0.74	14,000	2,213	2,965	......	HAH	76.01	76.[illegible]	599
[illegible]	[illegible]PH	M	[illegible] C. L. C. (Home Opening)	AR	......	2.97	21.74	68.90	6.39	0.72	13,620	2,213	2,965	......	HAH	76.02	76.[illegible]	599
			Average (No. 6 Pocahontas)	AD	3.19	0.41	22.51	72.41	4.64	0.86	14,839	2,227	2,695	2,749	......	76.24	76.64	......
			Average (No. 6 Pocahontas)	AR	......	4.06	21.98	69.29	4.67	0.78	14,395	2,227	2,696	2,749	......	75.86	76.31	......
			No. 3 Pocahontas Coal.															
48[illegible]	160PH	M	W. H. Sa[illegible]	AD	2.18	0.45	19.19	74.07	6.29	0.66	14,670	2,539	2,935	......	HAH	79.42	79.96	603
48[illegible]	160PH	M	W. H. S[illegible]	AR	......	2.62	18.81	72.41	6.16	0.65	14,380	2,539	2,935	......	HAH	79.38	79.92	603
486	148PH	M	[illegible] Goddard	AD	4.77	0.21	18.70	78.09	3.00	0.88	15,157	2,085	2,515	2,717	HAH	80.68	80.93	604
486	148PH	M	[illegible] Goddard	AR	......	4.97	17.81	74.36	2.86	0.84	14,[illegible]21	2,085	2,515	2,717	HAH	80.68	80.93	604
48[illegible]	157PH	P	Meadow River Coal and Land Co.	AD	3.23	0.36	20.34	72.07	7.23	0.80	14,[illegible]60	2,187	2,965	......	HAH	77.99	78.60	604
48[illegible]	157PH	P	Meadow River Coal and Land Co.	AR	......	3.58	19.68	69.74	7.00	0.77	14,088	2,187	2,965	......	HAH	77.99	78.60	604
			Average (No. 3 Pocahontas)	AD	3.39	0.34	19.41	74.74	5.51	0.78	14,896	2,370	2,805	......	......	79.36	79.85	......
			Average (No. 3 Pocahontas)	AR	......	3.72	18.77	72.17	5.34	0.75	14,396	2,370	2,805	......	......	79.35	79.85	......
			No. 1 Pocahontas Coal															
501	144PH	P	Ed. Griffen	AR	......	0.22	18.42	71.34	10.02	0.68	12,522	2,417	2,893	2,965	HAH	79.18	80.38	250
			Merrimac? (Pocono) Coal															
503	636R	P	*Mattie Abbott	AR	......	2.27	9.91	12.82	75.00	0.09	......	......	......	......	BBK	56.40	84.18	290
504	77PH	M	W. A. Napier	AD	0.45	0.82	13.59	63.22	22.37	12.10	11,103	......	2,068	......	BBK	82.31	84.78	291

*Not included in average.

Table of Coal Analyses—(Concluded).

(Under "Condition of Sample", "AD" = air dried; "AR" = as received; "DB" = dry basis).

No. on Map II.	Sample Number.	Mine Prospect or Core.	Coal Seam and Name of Mine or Prospect.	Condition of Sample.	Proximate. Moisture Lost on Air Drying.	Proximate. Moisture.	Proximate. Volatile Matter.	Proximate. Fixed Carbon.	Ash.	Sulphur.	Calorimeter B. T. U. for 1 lb. of Coal.	Softening Temperature of Ash. Degrees F. Initial Softening.	Softening Temperature of Ash. Degrees F. Fusion.	Softening Temperature of Ash. Degrees F. Melting.	Analyst.	Carbon Ratio. M. & A. Free.	Carbon Ratio. M. & M. M. Free.	Page.
			Merrimac? (Pocono) Coal															
504	77PH	M	W. A. Napier	AR	....	1.27	13.65	62.61	22.47	12.15	11,454	....	2,068	....	BBK	82.10	84.59	291
507	98PH	P	Near Judyton P. O.	AD	0.88	0.65	13.58	73.23	12.54	1.60	13,422	....	2,264	....	HAH	84.36	85.59	291
507	98PH	P	Near Judyton P. O.	AR	....	1.52	13.44	72.62	12.42	1.58	13,290	....	2,264	....	HAH	84.38	85.62	291
508	102PH	P	Floyd Childers	AR	....	0.54	10.79	76.48	12.19	0.49	13,390	2,397	2,935	....	HAH	87.64	88.88	292
			Average (Merrimac?) (Pocono)	AD	0.67	0.74	13.58	68.23	17.45	6.85	12,413	....	2,166	....	....	83.34	85.22	....
			Average (Merrimac?) (Pocono)	AR	....	1.11	12.63	70.57	15.69	4.74	12,711	....	2,422	....	....	84.71	86.45	....

CHAPTER XII.

LIMESTONE, ROAD MATERIAL, CLAY, BUILDING STONE, GLASS-SAND, FORESTS, AND SOILS.

LIMESTONE.

GENERAL STATEMENT.

From an economic viewpoint the limestone of Greenbrier County stands out as one of its most important assets. Next to coal and timber which are the greatest sources of revenue, limestone is the most valuable natural commodity produced in the county. The original source of wealth in order of importance was coal, timber, limestone, agricultural soils, mineral springs, water-power, iron ore, and manganese ore. Of these, the coal has been fully discussed in the preceding Chapter. The timber has been mostly removed and the possibilities of reforestation will be discussed later in this Chapter. A survey of the soils of Greenbrier County has been completed through the cooperation of the West Virginia Geological Survey and the Bureau of Chemistry and Soils of the United States Department of Agriculture and a separate report on this subject will be published in the near future. The mineral springs, water-power, iron ore, and manganese ore will be discussed in Chapter XIII.

There are three large limestone quarries located along railroads in Greenbrier County and many other small quarries scattered along the highways. The chief product of these quarries is crushed stone for railroad ballast and for black top roads. Ground limestone that is suitable for agricultural use and for rock dusting in coal mines is a by-product at the crushing plants. At least one quarry is now furnishing

limestone for use in the chemical processing of wood for paper.

In addition to the uses mentioned above, chemical analyses indicate that the limestone of the county is suitable for the manufacture of rock-wool, Portland cement and some of it is sufficiently pure to be used in making glass, steel, etc. Some of the limestone has a pleasing color and a texture suitable for building stone.

The commercially important limestones are those of the Greenbrier Series but the limestones of the overlying Mauch Chunk and the much lower, Lower Devonian and upper Silurian have some commercial possibilities. In quantity the supply of limestone in Greenbrier County might be roughly spoken of as unlimited. Located, as it is, with ready access to railroads and highways, it is probable that industries based upon this resource will be greatly expanded in the future. The outcrop of the rocks of the Greenbrier Series, which are the most important, is shown on Figure 10, page 269, and on Map II in greater detail.

LIMESTONES OF THE MISSISSIPPIAN PERIOD.

In the Mississippian Period there are numerous limestones of a variety to suit every purpose. In the Mauch Chunk Series the Avis, Reynolds, and Glenray Limestones are generally too impure for many uses but they are suitable for road material or manufacture of rock-wool and cement. In the Greenbrier Series, limestone of almost any degree of purity can be found. The Maccrady and Pocono Series as herein delimited are devoid of true limestone deposits although some of the shales and sandstones are calcareous.

LIMESTONES OF THE MAUCH CHUNK SERIES.

AVIS LIMESTONE.

The Avis Limestone of the Hinton Group, previously described on page 261, is the youngest and therefore the highest calcareous formation with economic possibilities in Greenbrier County. It is generally composed of fairly good limestone that is steel-gray in color and is sometimes separated into two benches with a thin calcareous shale between. It varies in thickness from 10 to 30 feet.

This limestone has been quarried 2.15 miles southeast of Rupert along the Midland Trail (U. S. Route 60). The limestone from this quarry **(No. 1 on Map II)** was crushed and used in paving the road mentioned. The quarry is abandoned but a sample (No. 185-PH) was collected from the least weathered face. The results of the chemical analysis are shown in the Table of Limestone Analyses, page 631.

Judging from this analysis the rock would be well suited to the manufacture of rock-wool or Portland cement but from the way the rock slakes on weathering it is doubtful if it would be suitable for concrete aggregate. The limestone is too high in impurities to be used as a source for lime.

REYNOLDS LIMESTONE.

The Reynolds Limestone of the Bluefield Group, described on page 264 as a blue or yellowish-blue limestone, is generally too high in impurities for most uses. It varies from 15 to 40 feet in thickness but it is doubtful if this rock could be used to a good advantage. Limestone of a similar or better character can generally be found exposed to a better advantage in the underlying Greenbrier Series.

GLENRAY LIMESTONE.

The Glenray Limestone of the Bluefield Group, described on pages 264-5 as being a gray limestone, varies in thickness from 10 to 60 feet. Like the Reynolds, this limestone will probably not be exploited due to the fact that better limestone can usually be found in the near-by outcrops of rocks of the Greenbrier Series. A sample was collected from this horizon and its analysis is published under number 169-PH in the Table of Limestone Analyses, page 631.

LIMESTONES OF THE GREENBRIER SERIES.

The **Greenbrier Series**, varying in thickness from 475 to 700 feet and composed almost entirely of limestone, offers numerous opportunities for commercial exploitation. As shown by Figure 10 and in more detail by Map II there is a vast area of this series exposed in Greenbrier County. In Chapter VII attention has been called to the difference in physical

features of the respective members of this series, and to the fact that it is often possible to recognize them at widely scattered points by means of their lithology.

In chemical composition the limestones of this series vary from 1.3 to 36 per cent. in silica, from 29 to 97 per cent. in calcium carbonate, and the magnesium carbonate is generally low. It can therefore be seen that these limestones might be used for numerous purposes where calcareous material is desired. Many of the analyses tabulated fall within the range required for the manufacture of Portland cement where a calcium carbonate content of approximately 75 per cent. and a magnesium carbonate content of less than five per cent. is required. From an examination of the Table of Limestone Analyses it can be seen that there are some localities where certain members of the Greenbrier Series are suited for Portland cement without the admixture of other material. At other points it would be necessary to add certain quantities of shale to lessen the lime content, but this material is readily available just above the limestone in the basal Mauch Chunk Series. Many analyses shown in the table indicate that some of the limestone would be suitable for the manufacture of rock-wool. With more and more emphasis being placed on air conditioning, the manufacture of this ideal insulating material may become a major industry in the near future.

The Chesapeake and Ohio Railway roughly parallels the outcrop of these deposits and there is ample water and labor supply, while vast quantities of coal are available in near-by areas. With such favorable factors it would appear that the further development of these deposits will not long be overlooked.

ALDERSON LIMESTONE.

The Alderson Limestone, coming at the top of the Greenbrier Series and already described on page 271, is a dark-gray, siliceous or shaly limestone, with a thickness ranging between 50 and 150 feet. This member is generally too impure for the many uses that require a high lime content but it would appear that it might be suitable for rock-wool or Portland cement. The more massive beds could also be used where

a hard durable limestone is needed as in roads, concrete aggregate, railroad ballast, etc.

UNION LIMESTONE.

The Union Limestone, previously described on page 272, is a massive, hard limestone. It is often oolitic and varies in color from light- to dark-gray. It ranges from 150 to 200 feet in thickness and because it often has a very high lime content, this member offers many possibilities for commercial exploitation. Six quarries in the county are wholly or partly in the Union Member.

An abandoned quarry **(No. 2 on Map II)** was noted in the white oolitic part of the Union, 2.8 miles southeast of Blue Sulphur Springs. Two miles farther south or 2.2 miles north of Alderson, another abandoned quarry **(No. 3 on Map II)** was noted in the Union Member. The stone from these quarries was probably used on the roads along which they are located.

H. Frazier & Company Quarry—No. 4 on Map II.

On siding of Chesapeake and Ohio Railroad, 0.4 mile south of Frazier and 1.4 miles southwest of Fort Spring; leases equipment from C. & O. R. R.; all limestone is used for railroad ballast; employs 30 skilled and 25 unskilled workmen for 8 or 9 months of year; first opened in 1902; average day's output, 20 cars of ballast and 4 cars of "grit"; dip, northwest; **Alderson** and **Union**; elevation of quarry floor, 1750′.

	Feet.
Limestone quarry face	30 to 80

A small blast in the above quarry is shown on Plate IL. At the west end of the quarry, (not shown in the picture), is a large crushing and screening plant.

Acme Limestone Company Quarry—No. 5 on Map II.

On Chesapeake and Ohio Railroad, 0.95 mile west of Fort Spring and 0.6 mile northeast of Frazier; dip, 15° N. W.; see Acme Limestone Quarry Section in Chapter V for detailed measurements; samples, 171-PH to 184-PH; **Alderson, Union,** and **Pickaway**; elevation, 1750′.

	Feet.
Quarry face	100 to 150

The crushing and screening plant of the Acme Limestone Company is shown on Plate XLVI and the quarry is shown in Plates XLVII and XLVIII. Plate XLVII shows the putting off

of a huge shot, in which several tons of explosive were used. On Plate XLVIII can be seen the drilling machines used in preparing for the big shots.

The screening plant is equipped to furnish graded stone of a large variety of sizes. Stone from this plant is used for railroad ballast, concrete aggregate, road paving, agriculture, and other uses. The Interstate Amesite Company plant is located near this quarry and uses a considerable part of the crushed limestone.

At the request of the U. S. Engineer's Office of Huntington, W. Va., the Materials Engineer of the State Road Commission ran tests on three samples from this quarry and the results are as follows:

"STATE ROAD COMMISSION

of

WEST VIRGINIA

Office of Materials Engineer

Mechanical Hall

Morgantown, W. Va.

Report on Sample of Rock
Laboratory No. 78237 February 19,1936
Road (Bluestone Dam) County Summers
Submitted by U. S. Engineer's office, Huntington, W. Va.
Received February 7, 1936
Brand Limestone Identification Marks Ledges Nos. 14 to 16 incl.
Source Acme Limestone Company, Alderson, W. Va.
Sampled from quarry Quantity Represented unlimited

Test Results

Chemical Analysis	%
Silica and Silicates (Insoluble in HCl)	2.71
Iron Oxide	0.40
Aluminum Oxide	0.05
Calcium Carbonate	94.33
Magnesium Carbonate	2.30

Freezing and Thawing—25 cycles	O.K.
Toughness (ledge No. 15)	6
Abrasion—Per cent. Wear—Deval	3.2
Abrasion—Per cent. Wear—Los Angeles	12.4

Report on Sample of Rock
Laboratory No.78238 February 19, 1936
Road (Bluestone Dam) County Summers
Submitted by U. S. Engineer's Office, Huntington, W. Va.
Received February 7, 1936

Brand Limestone Identification Marks Ledges Nos. 8 to 12 incl.
Source Acme Limestone Company, Alderson, W. Va.
Sampled from quarry Quantity Represented unlimited

Test Results

Chemical Analysis	%
Silica and Silicates (Insoluble in HCl)	12.94
Iron Oxide	1.28
Aluminum Oxide	0.51
Calcium Carbonate	78.13
Magnesium Carbonate	6.48

Freezing and Thawing—25 cycles	O.K.
Toughness (ledge No. 12)	8
Abrasion—Per cent. Wear—Deval	3.6
Abrasion—Per cent. Wear—Los Angeles	11.0

Report on Sample of Rock

Laboratory No. 78236 February 19, 1936
Road (Bluestone Dam) County Summers
Submitted by U. S. Engineer's Office, Huntington, W. Va.
Received February 7, 1936
Brand Calcareous sandstone Identification marks ledge No. 13
Source Acme Limestone Company, Alderson, W. Va.
Sampled from quarry Quantity Represented unlimited

Test Results

Chemical Analysis	%
Silica and Silicates (Insoluble in HCl)	53.19
Iron Oxide	2.24
Aluminum Oxide	1.05
Calcium Carbonate	34.32
Magnesium Carbonate	8.86

Freezing and Thawing—25 cycles	O.K.
Toughness	16.5
Abrasion—Per cent. Wear—Deval	1.9
Abrasion—Per cent. Wear—Los Angeles	6.2

Respectfully submitted,
FRED A. DAVIS,
Materials Engineer."

Subsequent to the completion of the field work for this report, a quarry was opened in the upper part of the Union Member, located approximately 3.5 miles west of Lewisburg. The reported location of this quarry was received just before the completion of the drafting work on the geologic map and is shown as quarry No. 5A on Map II. Unfortunately the reported location is in error, the actual location being 0.8 mile northwest of that shown on Map II.

A kiln has been built for use in burning lime from the quarry. Lime is produced for both chemical and agricultural use. It is reported that the Cherry River Paper Company of

PLATE XLVI.—Crushing and screening plant of the Acme Limestone Company west of Fort Spring. Photo. by courtesy of Acme Limestone Company.

PLATE XLVII.—Putting off a large shot at the Acme Limestone Company Quarry (No. 5 on Map II) 0.9 mile west of Fort Spring. Photo. by courtesy of Acme Limestone Company.

PLATE XLVIII. Acme Limestone Company Quarry face (No. 5 on Map II). Note drilling machines and stripping the limestone of soil by hydraulic "gun."

PLATE II.—Small shot in the Frazier Limestone Company Quarry (No. 4 on Map II), 1.4 miles southwest of Fort Spring.

Richwood, Nicholas County, is the largest purchaser of lime from this quarry at the present time. The quarry was visited and sampled in connection with the preparation of a report on the limestone resources of the State.

Lewisburg Limestone Products Company Quarry—No. 5A on Map II.

On Frank Tuckwiller land, just east of Muddy Creek Mountain, 3.5 miles west of Lewisburg, and 0.8 mile northwest of location shown on Map II; face 30 feet by 150 feet and growing west; beds, flat; home office, Richwood, W. Va.; upper Union Member; measured and sampled by John B. Lucke.

Section rewritten in descending order:

	Thickness. Feet.	Total. Feet.
Limestone, impure, very shaly, greenish-gray, not used in quarry operation, sample 7	10+	10
Limestone, varies upward from black, coarsely crystalline irregular fracture, very fossiliferous to dark bluish-gray, finely crystalline, less fossiliferous except top foot which is a rich crinoid bed, samples 5 and 6	9	19
Limestone, single bed, but varies upward from medium light to medium dark gray, largely oolitic, samples 3 and 4	10	29
Limestone, single bed, pure, nearly white, oolitic bed, samples 1 and 2	11	40

The chemical analyses of the samples are as follows:

Sample	Lab. No.	CO_2	SiO_2	Fe_2O_3	$CaCO_3$	$MgCO_3$	Total
*1	1211	43.8	....	....	....	....	....
*2	1212	43.8	....	....	....	....	....
3	1213	43.8	....	....	....	....	....
4	1214	43.4	....	....	....	....	....
5	1215	40.3	....	....	....	....	....
*6	1216	43.6	....	....	....	....	....
7	1217	24.9	....	....	....	....	....
*Composite analysis		....	2.23	0.31	95.71	2.15	100.40

Abandoned Limestone Quarry—No. 6 on Map II.

On west side of U. S. Route 219, 2.25 miles northeast of Falling Springs, and 1.8 miles west of Julia; Union; elevation, 2300′

Limestone, thickness undetermined................................

Abandoned Limestone Quarry—No. 10 on Map II.

On west side of U. S. Route 219, 0.9 mile north of Frankford; dip, 10 degrees W. N. W.; Union; elevation, 2260'.
Limestone, thickness undetermined..................................

PICKAWAY LIMESTONE.

The Pickaway Limestone, already described on pages 272-7, is a blue to yellowish-gray limestone that is high in silica. The peculiar jointing in one of the ledges in this member was described on the pages cited where it was pointed out that the joint filling is considerably higher in impurities than is the rest of the limestone. The more massive beds of this member including the unweathered jointed ledge, would be suitable for road material, concrete aggregate, railroad ballast, etc. The upper part of this member is exposed in the east end of the **Acme Limestone Company Quarry (No. 5 on Map II).** From the chemical analyses given on page 631, it would appear that this member would be ideal for the manufacture of rock-wool.

TAGGARD LIMESTONE.

The Taggard Limestone, previously described on pages 277-8, was sampled at two localities in the northern part of the County. As shown in the Table of Limestone Analyses, page 631, it is somewhat high in silica. Its characteristics can be duplicated or bettered in other beds of the Greenbrier Series so that its commercial possibilities are small.

PATTON LIMESTONE.

The Patton Limestone, previously described on page 278, is somewhat impure at the top but contains several ledges of very pure limestone. In appearance this member closely resembles the underlying Sinks Grove Limestone. The following quarries were noted as belonging in this member:

Abandoned Limestone Quarry—No. 9 on Map II.

On east side of U. S. Route 219, 1.0 mile south of Frankford; used for road material; Patton; elevation, top, 2290' B.
Limestone, dark-gray, hard, fossiliferous.........................

Renick Stone Company Limestone Quarry—No. 11 on Map II.

Located 0.9 mile east of Renick P. O., on the Chesapeake and Ohio Railroad; crusher and screening plant; main part of output is used for railroad ballast; plant capacity, 5 to 7 railroad cars a day (cars of 50- to 55-yd. cap.); quarry floor, 100± feet above red Maccrady shales; quarry face, 90-160 feet high by 500 feet long; R. B. Holt, lessee; address, Renick, W. Va.; **Patton**; elevation, 1940′ B.

	Feet.
Limestone, dark bluish-gray	90 to 160

The following section, measured by John B. Lucke, has been rewritten in descending stratigraphic order. The numbers refer to chemical analyses published on page 632. Samples procured from the quarry floor under direction of the foreman:

	Thickness. Feet.	Total. Feet.
9. Sample of ledge about ⅔ to top of quarry face. Ledge about 20 feet thick, underlying 2 similar ledges	20	20
Limestone, not sampled	30	50
8. Limestone, very hard, finely crystalline, fossiliferous, many silty or thin green shale breaks	7	57
7. Limestone, dark-gray, silty, very massive, dense, stylolitic, fossiliferous in nodules or reefs	8	65
6. Limestone, very dark gray to black, finely crystalline, fossiliferous, very hard, brittle, stylolitic	20	85
5. Limestone, massive, sandy, banded light to medium gray to brown, no fossils	5	90
4. Limestone, very fine-grained, light-gray, cryptocrystalline, similar to 3 but slightly darker, black stylolites	9	99
3. Limestone, very light gray, cryptocrystalline, dense, smooth, perfect conchoidal fracture, few black stylolites	3	102
2. Limestone, dark-gray, tough, crystalline, fossiliferous	6	108
1. Limestone, best exposed on west end of quarry, blue-gray, massive, finely crystalline, fine fossils, many black stylolites	12	120

From the analyses shown in the Table of Limestone Analyses, page 632, the limestone in the above quarry would be suitable for railroad ballast, concrete aggregate, road material and much of it is suitable for the many uses requiring a high lime content.

SINKS GROVE LIMESTONE.

The Sinks Grove Limestone, previously described on pages 278-9 has an appearance that is quite similar to the overlying Patton Limestone. It generally has a very high lime content and

is sometimes oolitic. It sometimes contains scattered nodules of dark chert. Several quarries have been opened in this member.

H. B. and H. N. Fullen Quarry No. 1—No. 7 on Map II.

On west side of U. S. Route 219, 0.25 mile south of Lewisburg; mild dip to northwest; Sinks Grove; elevation, 2200′.

	Thickness. Feet.	Total. Feet.
1. Limestone, dark, hard	10	10
2. Limestone, dark, hard	28	38

Two samples (Nos. 187-PH and 186-PH) were taken from Nos. 1 and 2 of the above section and the results of chemical analysis are published in the Table of Limestone Analyses on page 632. There is a small crushing and screening plant at the quarry.

H. B. and H. N. Fullen Limestone Quarry No. 2—No. 8 on Map II.

On Wade farm, 0.2 mile east of U. S. Route 219, 2.4 miles northeast of Lewisburg and 0.95 mile west of Edgewood School; dip, 5° west northwest; Sinks Grove; elevation, 2200′±.

	Feet
Limestone, dark-gray, brittle	15

A sample (No. 164-PH) was collected from the above quarry and the results of the chemical analysis are published in the Table of Limestone Analyses on page 632.

The State Department of Mines reports a limestone quarry operated by Mr. S. O. Collison of Lewisburg. In reply to an inquiry, Mr. Collison reports that his quarry is located just west of the city limits of Lewisburg, on the north side of the Midland Trail (U. S. Route 60). The quarry is probably in the Patton or Sinks Grove.

HILLSDALE LIMESTONE.

The Hillsdale Limestone, previously described on page 279, is of minor economic importance in Greenbrier County. As a rule it contains too much chert to be used for most purposes and the nodules are hard on crushing machinery. Occasionally, however, the chert may be largely absent and the limestone appears to be of high quality.

One abandoned quarry **(No. 12 on Map II)** was noted in this member. It is located along the Midland Trail (U. S. Route 60) 0.8 mile west of Alta. The crushed limestone was probably used for road material.

LIMESTONES OF THE DEVONIAN AND SILURIAN PERIODS.

GENERAL STATEMENT.

The older limestones of Greenbrier County, including the Lower Devonian and Upper Silurian limestones, are of much less extent and commercial value than are those of the Mississippian. Their outcrops are confined to the Coles-Beaver Lick Mountain area as shown on Figures 14 and 15.

In the Devonian, some of the limestone of the Helderberg, particularly the Keyser Member, is fairly high in lime content. In the Silurian there are a few beds in the Salina and Niagara Series that also seem to be fairly pure. Because of the general inaccessibility of these beds and because of the vast supply of limestone from the Greenbrier Series, it is doubtful if they will ever be of more than local value.

HELDERBERG LIMESTONE.

The limestone of possible commercial value in the Helderberg in Greenbrier County is confined to the Becraft and Keyser Members. The limestone in the Becraft is high in silica due to sand, silicified fossils, and chert, so that it will probably not be used for anything but local use. Some of the beds of the Keyser appear to be fairly pure but the better limestones of the Greenbrier Series and Silurian minimize the importance of this source of lime. The description of these limestones is published on pages 323-5, and a few analyses are published in the Table of Limestone Analyses, page 632.

SALINA SERIES.

The Salina Series, composed of the Bossardville and Rondout Groups, was described on pages 331-2, where it was pointed out that their outcrop is generally inaccessible except for the region just west and north of Alvon. A few

of the beds appear to be fairly pure, one of the chemical analyses showing 93.4 per cent. calcium carbonate. Three analyses from rocks of this series are published in the Table of Limestone Analyses, page 632.

NIAGARA SERIES.

The Niagara Limestone, previously described on pages 332-4, is the only one of these lower limestones that is being used commercially at the present time. The C. C. C. workers have opened a quarry in the Anthony Creek gorge just west of Alvon and are using the limestone for bridge abutments and construction work. As shown in the Table of Limestone Analyses, one sample was collected from this limestone. As seen from the analysis the limestone is fairly pure but due to its small area of outcrop and its general inaccessibility, it will not be of more than local importance.

TABLE OF LIMESTONE ANALYSES.

The following table gives a summary of the results of the chemical tests made on the limestones of Greenbrier County. The samples were collected by Price and others and the analyses were made in the Survey Laboratory by Mr. Homer A. Hoskins, Chemist. No attempt was made to collect complete sets of samples except at a few of the quarries but samples were obtained from the various calcareous members that appear to have commercial value. Following the table are brief references to the location and portion of the formations sampled. The sample numbers are the same as those mentioned in the foregoing text:

Table of Limestone Analyses, Greenbrier County.

Sample No.	Name of Limestone	Silica (SiO_2)	Ferric Iron (Fe_2O_3)	Alumina (Al_2O_3)	Manganese Dioxide (MnO_2)	Calcium Oxide (CaO)	*Calcium Carbonate ($CaCO_3$)	Magnesium Oxide (MgO)	*Magnesium Carbonate ($MgCO_3$)	Potash (K_2O)	Soda (Na_2O)	Titanium Oxide (TiO_2)	Phosphoric Acid (P_2O_5)	Moisture	Not Determined	**Loss on Ignition	Total
185-PH	**Avis**	14.72	2.73	3.97	Pr.	39.22	70.00	2.22	4.64	....	....	....	0.024	0.23	3.10	33.79	100.00
169-PH	**Glenray**	9.00	(1.81)		Tr.	47.35	84.51	3.69	7.72	....	....	....	0.06	0.13	....	39.32	101.36
184-PH	**Alderson**	9.25	1.40	2.35	Tr.	46.72	83.38	1.66	3.84	....	....	....	0.03	0.24	0.15	38.20	100.00
183-PH	Union	2.35	0.51	0.57	Tr.	52.38	93.48	1.22	2.57	....	....	....	0.01	0.28	0.37	42.31	100.00
182-PH	Union	1.30	0.04	0.48	....	54.30	96.91	0.90	1.87	....	....	....	0.006	0.15	....	43.19	100.37
181-PH	Union	3.25	0.47	0.81	Tr.	50.23	89.65	2.74	5.74	....	....	....	0.02	0.20	0.39	41.89	100.00
180-PH	Union	16.10	1.44	3.92	Tr.	34.20	61.04	8.22	17.18	....	....	....	0.02	0.71	....	36.51	101.12
179-PH	Union	5.75	0.41	1.26	Tr.	49.15	87.72	2.21	4.62	....	....	....	0.02	0.16	0.22	40.82	100.00
178-PH	Union	4.40	0.51	0.99	Tr.	50.50	90.13	2.01	4.21	....	....	....	0.01	0.07	0.20	41.31	100.00
177-PH.	Union	15.09	2.05	2.42	Tr.	37.94	67.71	6.13	12.87	....	....	....	0.03	0.14	0.36	35.84	100.00
176-PH	Union	8.62	1.90	1.54	Tr.	45.93	81.97	2.93	4.60	....	....	....	0 04	0.09	0.41	38.54	100.00
175-PH	Union	7.90	2.03	0.99	Tr.	46.38	82.77	2.69	5.63	....	....	....	0.014	0.10	0.87	39.03	100.00
168-PH	Union	7.12	(2.46)		....	44.87	80.00	4.45	9.30	Tr.	....	....	0.04	0.18	1.28	39.60	100 00
170-PH	Union	3.50	(1.10)		Tr.	50.78	90.63	2.53	5.29	....	....	....	0.04	0.11	0.13	41.81	100.00
Average	**Union**	6.85	(2.35)		Tr.	46.42	82.85	3.11	6.43	....	....	....	0 26	0.19	0.68	39.44	100.20
174-PH	Pickaway	5.52	1.08	0.93	Tr.	50.08	89.38	1.24	2.59	....	....	....	0.008	0.18	0.74	40.22	100.00
173-PH	Pickaway	32.40	2.31	6.67	Some	25.99	46.38	4.94	10.32	....	....	....	Some	0.20	2.25	25.24	100.00
172-PH	Pickaway	17.08	2.34	6.11	Some	37.06	66.14	2.78	5.82	....	....	....	Some	0.26	1.82	32.55	100.00
171-PH	Pickaway	31.23	2.10	5.28	Some	29.53	52.69	3.08	6.44	....	....	....	Some	0.29	1.69	26.80	100.00
167-PH	Pickaway	26.83	(8.41)		....	31.99	57.11	2.22	4.64	Tr.	Tr.	....	0.07	0.26	2.79	27.43	100.00
Average	**Pickaway**	22.61	(3.91)		....	34.93	62.34	2.85	5.96	....	....	....	0.016	0.24	1.86	30.45	100.00
99P-H	Taggard	12.54	1.27	2.12	Tr.	45.19	80.65	1.83	3.81	Tr.	Tr.	Tr.	Tr.	....	....	37.29	100.24
165-PH	Taggard	9.45	(1.71)		....	47.81	85.50	1.40	2.94	....	....	....	0.30	0.07	0.51	38.75	100.00
Average	**Taggard**	21.99	(1.70)		....	46.50	83.08	1.61	3.38	....	....	....	0.15	0.07	0.51	38.02	100.12

Table of Limestone Analyses, Greenbrier County—(Continued).

Sample No.	Name of Limestone	Silica (SiO₂)	Ferric Iron (Fe_2O_3)	Alumina (Al_2O_3)	Manganese Dioxide (MnO_2)	Calcium Oxide (CaO)	*Calcium Carbonate ($CaCO_3$)	Magnesium Oxide (MgO)	*Magnesium Carbonate ($MgCO_3$)	Potash (K_2O)	Soda (Na_2O)	Titanium Oxide (TiO_2)	Phosphoric Acid (P_2O_5)	Moisture	Not Determined	**Loss on Ignition	Total
[illegible]	Patton	[illegible].37	2.28	5.46	0.015	29.15	52.02	1.96	4.09	Tr.	Tr.	Tr.	None	0.12	3.15	24.40	100.00
[illegible]	Patton	2.00	0.64	0.15	0.008	53.02	94.62	1.56	2.71	....	....	....	None	....	....	42.35	100.47
[illegible]	Patton	5.72	0.73	1.16	0.01	50.32	89.80	0.92	1.92	....	....	....	None	0.08	0.39	40.67	100.00
[illegible]	Patton	8.17	0.93	1.53	0.01	47.49	85.75	2.38	4.98	....	....	....	None	0.08	0.07	39.34	100.00
[illegible]	Patton	36.54	0.81	2.30	0.01	30.50	54.44	2.39	4.99	....	....	....	None	0.02	0.79	26.44	100.00
[illegible]	Patton	6.11	0.65	1.38	0.01	47.95	86.57	3.15	6.60	....	....	....	None	0.04	0.08	40.63	100.00
[illegible]	Patton	5.14	0.72	1.56	....	38.40	68.50	11.89	24.88	....	....	....	None	0.04	....	42.76	100.51
[illegible]	Patton	3.02	0.33	0.46	0.02	51.81	92.50	1.87	3.91	....	....	....	None	....	....	42.56	100.07
[illegible]	Patton	2.95	0.37	0.46	Tr.	52.67	94.00	1.21	2.52	....	....	....	....	0.03	....	42.38	100.11
Average Patton		11.57	0.83	1.63	0.010	44.59	79.80	3.05	6.29	....	....	....	....	0.058	0.89	37.95	100.13
157-PH	Sinks Grove	1.93	0.25	0.66	Pr.	53.35	95.21	0.85	1.51	....	....	....	0.03	0.18	....	42.48	102.73
158-PH	Sinks Grove	2.48	0.61	0.84	Pr.	51.22	91.41	1.25	2.60	....	....	....	0.01	0.18	2.36	41.05	100.00
[illegible]-PH	Sinks Grove	6.19	(2.10)		....	49.74	88.77	1.27	2.66	....	....	....	0.03	0.08	0.42	40.17	100.00
[illegible]-PH	Sinks Grove	1[illegible].67	(1.90)		Tr.	45.20	80.67	1.93	4.04	....	....	....	0.09	0.14	0.18	36.89	100.00
Average Sinks Grove		6.81	(2.73)		Pr.	49.88	89.01	1.07	2.70	....	....	....	0.04	0.145	0.98	40.15	100.08
107-PH	Becraft	41.76	0.84	0.87	....	25.78	46.02	0.45	0.93	Tr.	Tr.	0.06	Tr.	....	....	20.72	100.48
108-PH	Keyser	42.61	0.82	2.32	Tr.	34.66	61.86	1.26	2.63	0.55	0.45	Tr.	0.09	....	....	28.57	101.33
109-PH	Keyser	4.55	0.90	0.60	....	49.95	89.15	1.90	3.91	Tr.	Tr.	Tr.	Tr.	0.08	....	42.46	100.51
110-PH	Keyser	7.44	0.90	0.92	Tr.	45.29	80.82	4.75	9.94	0.36	0.63	Tr.	0.07	0.13	....	39.97	100.46
Average Keyser		14.53	0.87	1.28	Tr.	43.30	77.27	2.63	5.49	....	....	Tr.	0.05	0.10	....	37.00	100.69
111-PH	[illegible]	8.54	0.90	0.98	Tr.	37.81	67.48	11.49	24.03	Tr.	Tr.	....	0.02	0.10	....	42.21	102.05
112-PH	[illegible]	1.92	0.45	0.22	Tr.	52.35	93.43	2.34	4.89	....	....	....	0.02	0.05	....	43.63	100.98
113-PH	[illegible]	2.79	0.55	0.50	Tr.	49.66	88.63	2.50	5.23	....	2.00	....	0.03	0.12	....	42.07	100.01
114-PH	[illegible]	4.22	0.53	0.71	Tr.	47.51	87.79	4.68	9.77	Tr.	Tr.	Tr.	0.02	0.08	....	45.37	103.11

*Not included in total.
**Mainly CO_2

185-PH. Avis Limestone, collected from Quarry No. 1 on Map II, 2 miles southeast of Rupert.

169-PH. Glenray Limestone, outcrop sample collected along Midland Trail (U. S. Route 60), 2 miles west of Alta, elevation, 2250′ B.

184-PH. Alderson Limestone, Acme Limestone Company Quarry—No. 5 on Map II, one mile west of Fort Spring; see section, page 622.

183-PH. Union Limestone, Acme Quarry; see 184-PH.

182-PH. Union Limestone, Acme Quarry; see 184-PH.

181-PH. Union Limestone, Acme Quarry; see 184-PH.

180-PH. Union Limestone, Acme Quarry; see 184-PH.

179-PH. Union Limestone, Acme Quarry; see 184-PH.

178-PH. Union Limestone, Acme Quarry; see 184-PH.

177-PH. Union Limestone, Acme Quarry; see 184-PH.

176-PH. Union Limestone, Acme Quarry; see 184-PH.

175-PH. Union Limestone, Acme Quarry; see 184-PH.

168-PH. Union Limestone, outcrop sample, along Midland Trail (U. S. Route 60), at Richlands.

170-PH. Union Limestone, outcrop sample, along Midland Trail, 2 miles west of Alta.

174-PH. Pickaway Limestone, Acme Quarry; see 184-PH.

173-PH. Pickaway Limestone, Acme Quarry; see 184-PH.

172-PH. Pickaway Limestone, Acme Quarry; see 184-PH.

171-PH. Pickaway Limestone, Acme Quarry; see 184-PH.

167-PH. Pickaway Limestone, outcrop sample of jointed member, 5 feet thick, along Midland Trail (U. S. Route 60) 0.7 mile northwest of city limits of Lewisburg, elevation, 2140′ B.

99-PH. Taggard Limestone, outcrop sample, 5 feet thick, 0.7 mile northwest of Renick, elevation, 2160′ B.

165-PH. Taggard Limestone, outcrop sample, along Seneca Trail (U. S. Route 219) at bridge crossing Spring Creek.

Gr 8-9. Patton Limestone, Renick Stone Company Quarry—No. 11 on Map II, one mile east of Renick P. O.; see section, page 627.

Gr 8-8. Patton Limestone, Renick Quarry; see Gr 8-9.

Gr 8-7. Patton Limestone, Renick Quarry; see Gr 8-9.

Gr 8-6. Patton Limestone, Renick Quarry; see Gr 8-9.

Gr 8-5. Patton Limestone, Renick Quarry; see Gr 8-9.

Gr 8-4. Patton Limestone, Renick Quarry; see Gr 8-9.

Gr 8-3. Patton Limestone, Renick Quarry; see Gr 8-9.

Gr 8-2. Patton Limestone, Renick Quarry; see Gr 8-9.

Gr 8-1. Patton Limestone, Renick Quarry; see Gr 8-9.

187-PH. Sinks Grove Limestone, H. B. and H. N. Fullen Quarry No. 1—No. 7 on Map II, 0.25 mile south of city limits of Lewisburg, see section, page 628.

186-PH. Sinks Grove Limestone, Fullen Quarry, see 187-PH.

166-PH. Sinks Grove Limestone, dark-gray, hard, upper 50 feet sampled, outcrop sample, along Midland Trail at eastern city limits of Lewisburg.

164-PH. Sinks Grove Limestone, H. B. and H. N. Fullen Quarry No. 2—No. 8 on Map II, 2.45 miles northeast of Lewisburg; dark brittle limestone 10-15 feet thick.

101-PH. Becraft Member, outcrop sample, on north side of Anthony Creek, 0.5 mile west of Alvon, thickness represented, 15 feet, at top of member.

108-PH. Keyser Member, outcrop sample, on north side of Anthony Creek, 0.5 mile west of Alvon, thickness represented, 20 feet; 130 feet below 101-PH.

109-PH. Keyser Member, outcrop sample, on north side of Anthony Creek, 0.5 mile west of Alvon, thickness represented, 40 feet; just below 108-PH.

110-PH. Keyser Member, outcrop sample, immediately below 109-PH; thickness sampled, 20 feet.

111-PH. Bossardville Group (?), outcrop sample; 210 feet below 110-PH.; thickness represented, 90 feet.

112-PH. Rondout Group, outcrop sample; just below 111-PH; thickness represented, 55 feet.

113-PH. Rondout Group, outcrop sample; just below 112-PH; thickness represented, 20 feet.

114-PH. Niagara Series, outcrop sample; just below 113-PH; thickness represented, 80 feet.

ROAD MATERIAL.

Limestone.—Probably the best local material for road building is limestone. As already pointed out vast deposits of limestone are available and it is often found outcropping along the roads, so that almost any amount needed can be secured close at hand or with very little distance of transportation. The distribution and suitability of the various limestones have been discussed in the preceding section of this chapter.

Chert.—For material to improve secondary roads in that part of the county east of the Greenbrier River and north of White Sulphur Springs, the value of the limestones is overshadowed by the presence of large deposits of chert fragments. The Huntersville Chert weathers in such a manner that it can be used on the roads without further treatment and large deposits are present that can be worked by steam shovels. These deposits usually contain enough fine material to serve as a natural binder under the weight of traffic. The surface of such a road may be kept smooth by periodic scraping.

River and Creek Gravel. Many of the rivers and larger creeks contain large amounts of gravel and afford a cheap supply of material for road improvement. This gravel may be

used particularly to improve muddy roads of secondary importance, where paved roads would be too expensive to maintain. Usually a good grade of gravel can be secured for aggregate for concrete paving, bridge abutments, and concrete in general.

Sand.—Sand, which is an important item in road building both for masonry and concrete, can generally be found along the rivers and creeks, being derived from the weathering of the various sandstones. Sand of better quality can be secured by crushing it from the sandstones but it is usually more expensive. Some of the sandstones, particularly those of the Pottsville and Mauch Chunk, are so situated at their outcrops that weathering has produced large quantities of loose sand.

In addition to these materials there are numerous sandstones as well as arenaceous shales that may often be used advantageously on local roads to improve their condition.

BUILDING STONE.

The sandstones of the county, as described in Part II of this report, vary from thin flaggy and shaly beds that are of no value as building stone to massive ledges 50 to 75 feet in thickness that can be worked into any desired shape. In the Pottsville Series there are several coarse, gray to white sandstones that can be used locally for dimension stone as the needs arise. In the Mauch Chunk Series many of the sandstones are often shaly and lenticular, while others are of massive and durable character with a pleasing texture. In the Greenbrier Series there are no sandstones suitable for building stone but some of the limestones might be successfully used for such purposes. The Maccrady Series offers no stone durable enough for construction material, but the Broad Ford Sandstone member of the underlying Pocono often attains a character suitable for dimension stone. As previously noted it has been quarried quite extensively at many points along the Greenbrier River for use in bridge abutments, building foundations and steps, where durability and abrasive resistance are important.

In the Devonian Period, the Chemung and Portage Series contain sandstones that are generally flaggy but often attain beds of considerable thickness. These beds weather out, break-

ing along the joint-planes into rectangular shapes of various sizes and with very smooth faces, so that further shaping is unnecessary.. The colors vary from gray to brown to green and buff. That a market could be found for these flags is quite likely since structures built from them are not only pleasing in appearance but very durable. Universities of central New York have constructed some of their finest buildings from stone of similar character.

The Genesee, Hamilton, and Marcellus Series are quite devoid of any rocks suitable for building stone in this county. The Oriskany is often massive and persistent but in this area it is generally unfit for masonry.

In the Silurian Period there are heavy sandstones in the Clinton Series, two of which are quartzitic and very durable but of such a character as to be very difficult to work, while a third, or "Iron Sandstone", is of a red color, very durable and often weathers into rectangular blocks so that further shaping is seldom necessary. Where these beds are not already broken by weathering, it is very difficult to shape them. The White Medina Sandstone is massive and generally quartzitic, like those of the Clinton, and it is very difficult to work into desirable shapes. In the Red Medina the sandstones are generally too shaly and irregular to be of any value.

CLAY.

GENERAL STATEMENT.

Clay, according to Ries[1], is an earthy substance of fine texture containing a mixture of hydrous aluminum silicates, with fragments of other minerals such as silicates, oxides, carbonates, etc., and colloidal material which may be of either organic or mineral character. The mass possesses plasticity (usually) when wet and becomes rock-hard when fired to at least a temperature of redness. The two most important classes of clays are **residual** and **transported**.

[1]Ries, H., Economic Geology, 5th edition, p. 170; 1925.

AVAILABLE CLAY AND SHALE.

RESIDUAL CLAY.

Residual clay is a type which was derived from the decomposition of the parent rock and which now remains where it was formed. Furthermore the most important deposits are formed from crystalline rocks although similar clay may be formed from stratified beds. So far as known no crystalline rocks occur in Greenbrier County and hence there are no clays from such an origin but occasional clay beds are found in this region at localities where decomposition of the stratified rocks has been sufficient to produce a clay which is residual and which has not been carried off by erosion. As a matter of fact all the rocks contain a certain amount of clay but in most cases it is only a thin veneer and is now better suited for soils than for ceramic use. The limestones, however, often leave a residual clay of varying thickness composed of the insoluble argillaceous impurities of the original formation. Such deposits can be found along the present outcrops of the limestone series where the topography is such that the decomposed product is not readily carried away by surface drainage.

In using a residual clay formed from decomposed limestone it is well to keep in mind that fragments of the limestone are quite injurious if not removed because when burned the limestone tends to slake and form a cavity of weakness and a white blotch on the finished product.

TRANSPORTED CLAY AND CONSOLIDATED CLAY OR SHALE.

Along the river valleys there are many points that retain considerable deposits of river clay which were derived from the decomposition of the rocks over which these streams flowed. These clays are suitable for the manufacture of brick or drainage tile, although the product might not compare favorably with the results from the original material as the sorting is often less complete. These deposits are included under Alluvium and are noted on Map II.

The consolidated clays or shales, composed principally of silica and alumina, with varying quantities of ferric iron and other minor impurities and having sufficient plasticity for molding, occur in large quantities over the county. Throughout

the Mauch Chunk Series, described in detail in Chapter VII on stratigraphy of the series and shown by outcrop on Map II, there are vast quantities of red shale suitable for building brick or drainage tile. Because of the generally high ferric iron content the finished product would have a pleasing red color without the need of adding a flux.

Subsequent to the completion of the field work for this report, a sample of shale was collected from the Mauch Chunk. The test results, as reported by Mr. John P. Nolting, Jr., are as follows:

Report on East Rainelle Brick & Tile Co. Sample.

This sample, composed chiefly of red shale, but including a small amount of yellowish shale, was collected from the Bluestone Group of the Mauch Chunk Series, about one-fourth mile east of East Rainelle, W. Va., along Route W. Va.-U. S. 60.

For test purposes, this shale was ground to pass through a 40-mesh sieve, mixed with water and passed through a pug mill a number of times. It was finally formed into bars about 1 inch in cross section. Part of these bars were cut into briquettes about 2 inches in length, and part into test bars about 8 inches in length.

The briquettes were then fired, part to cone 015 (770° C.), part to cone 05 (1030° C.) and the remainder to cone 5 (1180° C.). After firing, various tests were run on them, the results of which are shown on the accompanying sheet of "Average Characteristics".

All of the bars were fired to cone 5 (1180° C.). They were then measured for shrinkage and tested to determine the Modulus of Rupture, the results being shown on the accompanying sheet of "Average Characteristics".

As a result of these tests, it is apparent that the clay should be suitable for drain tile when fired to cone 016; for building brick when fired to cone 05 to 02; and for paving brick when fired to cone 5 to 6.

On the basis of the Modulus of Rupture, the test bars would be classified as grade "A" building brick.

The accompanying briquettes show the physical character of the material when fired to different temperatures:

Briquette Number	Cone Number	Degrees Centigrade	Degrees Fahrenheit
7	015	770	1418
16	05	1030	1886
23	5	1180	2156

Average Characteristics.

Data from Briquettes:

Water of Plasticity (based on 3 samples)	23.31%
Shrinkage Water (based on 3 samples)	8.95
Pore Water (based on 3 samples)	14.36
Volume Drying Shrinkage (based on 3 samples)	17.24
Linear Drying Shrinkage (based on 3 samples)	6.12
Apparent Porosity of Fired Piece:	
Fired to 770° C. (8 samples)	28.38%
Fired to 1030° C. (8 samples)	17.64
Fired to 1180° C. (8 Samples)	1.06
Volume Firing Shrinkage:	
Fired to 770° C. (7 samples)	+1.73%
Fired to 1030° C. (8 samples)	—1.18
Fired to 1180° C. (8 samples)	—1.91
Apparent Sp. Grav. of Fired Piece:	
Fired to 770° C. (8 samples)	2.55
Fired to 1030° C. (8 samples)	2.54
Fired to 1180° C. (8 samples)	2.33
Bulk Sp. Grav. of Fired Piece:	
Fired to 770° C. (8 samples)	1.83
Fired to 1030° C. (8 samples)	2.09
Fired to 1180° C. (8 samples)	2.30
Absorption of Fired Piece:	
Fired to 770° C. (8 samples)	15.55%
Fired to 1030° C. (8 samples)	8.44
Fired to 1180° C. (8 samples)	0.46

Data from Bars:

Linear Drying Shrinkage (7 samples)	5.71%
Linear Firing Shrinkage (7 samples)	7.29
Modulus of Rupture (7 samples)	3,144 lbs. per sq. in.

The shales of the Maccrady Series are similar to those of the Mauch Chunk and are favorably located along the railroad. As already pointed out, the shales of the Mauch Chunk and Maccrady Series could be used with the limestones of the Greenbrier Series to make a mixture suitable for Portland cement or rock-wool.

In the Pocono Series in general the shales are too closely associated with sandstone to offer much inducement to the ceramic industry.

In the Devonian Period the shales of the Catskill Series correspond favorably with those of the Mauch Chunk and are located in most cases along the Chesapeake and Ohio Railway so that they are easily available. The shales of the Chemung and Portage Series are interbedded with flaggy sandstones so that they offer little inducement, while the black Genesee and Marcellus Shales, lower down, contain so much organic matter that their shrinkage would be too great.

In the Silurian Period shales occur in the Clinton and Red Medina Series. In some cases the former by careful selection might be successfully used for building brick or tile, but their exposures are generally inaccessible so that the better located deposits would naturally outrank them in importance.

FIRE CLAY.

The true fire clays that have a quality of resisting high furnace temperatures are not known to occur in the county. It is possible that in the western portion of the county some of these clays may be associated with the coals but all clays associated with the coals are not fire clays, so that only further investigation will definitely determine their presence.

GLASS-SAND.

No development of glass-sand has been attempted in Greenbrier County, although there are one or more deposits that deserve detailed investigation. Since silica is the major ingredient of glass-sand, it influences the character of the ware. Sands with impurities, unless they can be easily removed, and especially if they are to be used for the higher grades of glassware, should be avoided. Chemical analyses of most sands show at least traces of iron oxide, alumina, titanium oxide, lime, magnesia, and organic matter, but these are often included in mineral grains separate from the quartz and may be easily removed.

Along with a good sand two other factors are important, one being a favorable quarry site and the other, access to good transportation. These various factors were considered in sampling sandstones for analysis in Greenbrier County. Among the numerous sandstones available only two offer glass-

sand possibilities, these being the Droop and Healing Springs Sandstones. The Oriskany Sandstone, which is quarried extensively in Berkeley County, is generally quite impure in Greenbrier.

The Droop Sandstone that covers several hundred acres on Muddy Creek Mountain meets the general requirements of a glass-sand unless it should be too fine. Unfortunately no screen tests were made but the sand is in general quite fine and might not all be retained in the 120-mesh which is usually demanded.

The Healing Springs Sandstone appears to be sufficiently pure to be considered as a possible glass-sand. Three analyses of samples collected from this horizon are given in the table below. The chief objections to this source of sand are its general inaccessibility and lack of good quarry sites.

As noted in the table one sample of the Keefer Sandstone was analyzed as a possible glass-sand. This rock is probably too quartzitic and its outcrop too inaccessible for economical use.

Table of Sandstone Analyses.

Sample No.	Sandstone	Silica (SiO_2)	Ferric Iron (Fe_2O_3)	Alumina (Al_2O_3)	Manganese ([illegible])	Lime (CaO)	Magnesia (MgO)	Titanium (TiO_2)	Phosphoric Acid (P_2O_5)	Moisture	Loss on Ignition	Total
168-PH	Healing Springs	98.[illegible]	0.34	0.32	0.29	0.66	0.29	———	Trace	0.03	0.47	100.74
165-PH	Healing Springs	[illegible]	0.10	0.[illegible]		Trace	0.40	Trace	Trace	0.03	0.31	100.01
137-PH	Healing Springs	98.[illegible]	0.14	0.13	Trace	0.70	0.02	Trace	Trace	0.03	0.64	99.80
116-PH	[illegible]	95.45	0.50	0.86	Trace	1.37	0.[illegible]	Trace	Trace	0.08	1.60	100.61

FORESTS.

In Volume V, pages 146-150 of the Survey Reports (1911), Mr. A. B. Brooks, former State Forester, has described briefly the forests and lumber industry of Greenbrier County. The descriptions of present conditions and lumber mills are now out of date but certain items are of much interest and are reprinted, in part, here.

ORIGINAL FOREST CONDITIONS.

The county may be divided into three districts according to the kinds of timber which each produced in greatest abundance. First, in the mountainous section on the east of Greenbrier River, white pine was the most valuable species. It grew in this county most abundantly on Anthony Creek and its tributaries. The following description of the white pine growing in Greenbrier and Pocahontas is given by Mr. Cecil Clay, former president of the St. Lawrence Boom and Manufacuring Company of Ronceverte:

"There are several hundred million feet of good white pine lumber in this district. The white pine growing as it does here at an altitude of 2,000 to 2,500 feet, has a climate about like that of lower Pennsylvania and much likeness to Susquehanna pine. Where the white pine grows it takes the ground to itself, and but little of other timber is found with it. It grows in several localities through the valley (Greenbrier). On Deer and Sitlington Creeks are 100,000,000 feet; on Knapp Creek and branches another 100,000,000 feet; and Spice, Laurel, and Davy Runs, with Anthony Creek, and some outlying patches, would yield a third 100,000,000 feet. This pine timber is perhaps a little heavier than the Pennsylvania pine, but is soft and smooth to work. It is generally a sound, red-knot timber, with remarkably thin sapwood, often averaging not over half an inch in a lot of 1,000 logs. As much as 40,000 feet can sometimes be cut on an acre."*

The timber of the limestone plateau, before referred to, was distinct from that on the east and north. Mr. W. A. Mastin, of White Sulphur Springs, describes the limestone area and its timber as follows:

"The eastern boundary line of the principal limestone area is, of course, the Greenbrier River as far down as Caldwell. Here the river turns more to the west passing out through the limestone and leaving an area of considerable size on its east and south. The western boundary line of the area begins at Alderson, passes up Muddy Creek,

*"Resources of West Virginia"—Maury and Fontaine.

by the way of Blue Sulphur Springs crosses the divide to Sinking Creek and continues on in that direction toward Trout Valley.

"The limestone section produced excellent timber, free from insect injuries and defects of every kind. It was nearly all hardwood, such as white oak, red oak, poplar, black walnut, hickory, and some wild cherry."

The third district lies in the mountainous sections of the north and northwest, and is characterized by such species as spruce, hemlock, yellow birch, and others that thrive at high altitudes. Even here, however, hardwoods predominate below an altitude of 3,000 feet and sometimes higher up than this. Following is a list of trees and the number of each kind growing on 1,000 acres on the head of Cherry River in this county. Locusts, hickories, and black walnuts with a diameter over 10 inches, and all others over 18 inches were counted*.

White oak	132
Chestnut oak	889
Hickory	86
Chestnut	1,513
White maple	3,258
Sugar maple	7,291
Locust	4
Beech	1,965
Birches	1,120
Gum	104
Cherry	349
White walnut	1
Poplar	529
Linden	1,014
Cucumber	937
Ash	576
Hemlock	2,303
Yew pine (Spruce)	34
Total	22,264

THE LUMBER INDUSTRY.

Most of the limestone area, where the best hardwoods grow, was settled and the timber destroyed in the process of clearing the land for cultivation before it could be sold for profit and in a day when timber was considered inexhaustible and of little value. A little of it was utilized for building and fencing purposes and for fuel.

Small water-power sawmills were located here and there in an early day. After those came the portable steam sawmills.

*"Resources of West Virginia"—Maury and Fontaine.

The latter were not common until the Chesapeake and Ohio Railroad was extended westward from White Sulphur Springs about the year 1873. After that time many of these mills were located near the line. The principal shipping points for lumber were White Sulphur Springs, Caldwell, and Ronceverte. When the Chesapeake and Ohio Railroad was built up the Greenbrier River a similar industry was begun all along the line. When available sites for the small mills became scarce near the railroad many of them moved back into the interior where they are still engaged in sawing for small owners and hauling the lumber wagons to the railroad.

The first large band-saw operation in the county was that of the St. Lawrence Boom and Manufacturing Company. This company came to Ronceverte in 1882 and erected a circular mill. In 1884 this was replaced by a double band mill which continued to operate until 1910. During 24 years the mill cut 433,000,000 feet of white pine from Greenbrier and Pocahontas Counties. After 1902 the white pine supply began to fall off and considerable hemlock and hardwood timber was sawed. This company erected a single band mill at Shryock on Anthony Creek in 1909 which it is now operating.

Some of the large operators that have completed their work were the Henderson Lumber Company, with a band mill at the mouth of Anthony Creek; the Clear Creek Lumber Company, and the Kittanning Lumber Company, both with large circular mills in the Greenbrier section.

Among the present extensive operators, some of which have cut over vast forest areas, may be mentioned the Cherry River Boom and Lumber Company located at Richwood in Nicholas County; the Fenwick Lumber Company at Fenwick, Nicholas County, and the Neola Lumber Company at Neola, all band mill operations. Donaldson Lumber Company and Kendall-Deter Lumber Company are operating large circular mills near Anthony on the Greenbrier River.

Much of the fine walnut timber was destroyed. That which remained until after the coming of the railroads was eagerly sought after and even the stumps throughout the Greenbrier Valley were bought and removed.

Chestnut oak timber once grew in abundance in the county and furnished material for an active tan-bark industry which has lasted through a long period of years.

PRESENT FOREST CONDITIONS.

Mr. A. B. Brooks mentions that in 1911 there was approximately 140,000 acres of virgin forest and 105,000 acres of cut-over land in Greenbrier County. At the present time the area of virgin forest remaining in the county has been reduced to a few scattered patches aggregating a few thousand acres. There is one stand of virgin forest on Beaver Lick Mountain about four miles north of Alvon and scattered areas in other parts of the county.

Much of the cut-over land is unfit for anything but forests and as will be described below steps are being taken by the Federal government toward replanting and protecting this land.

MONONGAHELA NATIONAL FOREST.

The purchase area of the Monongahela National Forest extends into Greenbrier County in two prongs, one in the northeast corner and one in the northwest part. The eastern boundary coincides with the State line from the Pocahontas County line, southward to the junction of the State line and the White Sulphur-Anthony Creek District line. The Forest boundary roughly follows the district line to the Greenbrier River just below Anthony. From this point the boundary of the purchase area extends northward along the Greenbrier River to the Pocahontas County line. The boundary of the northwestern prong enters Greenbrier from Pocahontas County at Boggs Run about one mile north of Beulah Church and extends in a straight line to Twin Sugars. The boundary extends northwest to Cold Knob and Grassy Knob. From this point it follows the Meadow Bluff-Williamsburg District line to the Nicholas County line near Lile.

As outlined above the proposed area of the National Forest occupies 210,903 acres in Greenbrier County of which 93,981 acres have already been acquired by the United States Government. The following table, taken from a report of the Department of Agriculture, shows the proposed acreage

of the Monongahela National Forest and the amount acquired in each county. The figures are as of June 30, 1937:

County	Proposed extent, Acres.	Approved for Purchase, Acres.	Acquired, Acres.
Grant	43,700	13,634	13,328
Greenbrier	210,903	96,571	93,981
Nicholas	45,939	23,428	20,286
Pendleton	149,500	58,198	56,321
Pocahontas	537,288	266,987	243,859
Preston	12,192	3,891	3,891
Randolph	361,299	164,692	152,443
Tucker	202,700	87,913	85,860
Webster	110,131	64,707	60,744
Total	1,673,652	780,021	730,713

Under the direction of Mr. Arthur A. Wood, Forest Supervisor, Elkins, W. Va., many improvements have been made on the land already acquired. Several fire trails have been built in Greenbrier County and fire towers have been erected. A beautiful recreation spot has been developed at Blue Bend on Anthony Creek about three miles east of Anthony. The location of this park is shown on Map II. The Forest Service has issued a very interesting pamphlet on the Blue Bend Park and copies of this pamphlet may be obtained at any of the district offices. The improvements made at the park consist of a large log Administration Building, picnic shelter, bath-houses, toilets, and facilities for camping.

LUMBER MILLS.

The following is a list of the larger lumber concerns operating at the present time in Greenbrier County:

Meadow River Lumber Company at Rainelle.
Ronceverte Lumber Company at Ronceverte.
Spring Creek Lumber Company at Spring Creek.
Wilderness Lumber Company at Nallen, Fayette County.
Cherry River Boom and Lumber Company at Richwood, Nicholas County.

In addition to the above concerns there are several small portable sawmills operating in the county.

SOILS OF GREENBRIER COUNTY*

by

Anton J. Vessel,

United States Department of Agriculture,

Bureau of Chemistry and Soils.

The soils of Greenbrier County belong to the Gray-Brown Podzolic group of United States soils. They have developed from various parent materials chiefly under a deciduous forest cover in a humid climate where the winters are not too cold and the summers are not too hot. The soils of the area do not contain much organic matter. In forested areas a thin layer of leaf-mold is mixed with the topmost layers of the surface soil. The soils are dominantly light in color and highly leached of bases and plant nutrients. All of the soils except those recently limed are acid throughout the profile. They respond well to fertilizer and lime treatments. The most important soils are those of the limestone valley. They dominate the agriculture of the county which is centered around livestock raising.

Greenbrier Valley is underlain with Greenbrier Limestone of great thickness. Various members comprising this series cause some variation in the types of the resulting soils. The purer members give rise to the Frederick soils which possess grayish-brown and brownish-yellow surface soils and reddish-yellow or light-red subsoils. Locally some shale is included with the Frederick soils. On steep slopes where great thicknesses of the Greenbrier Formation have been mapped as one type, some areas of Hagerstown soils are intermixed with the Frederick and are mapped as Frederick-Hagerstown stony silt

*The above brief summary of the soils of Greenbrier County shows the relationship of the soils to the geologic formations outcropping in the county. Mr. Vessel has recently completed the field work for a detailed soils map and report of the area. It is expected that the report will be published in the near future by the Bureau of Chemistry and Soils of the United States Department of Agriculture, Washington, D. C. Inquiries concerning the soils of the county should be addressed to the Bureau.

loam. The Hagerstown soils possess a browner surface soil and a darker red subsoil than the Frederick. They are developed from the residue that is left after the solution of limestone of great purity. Siliceous and platy limestone practically free from chert give rise to the Frankstown soils in this county. These differ from the Frederick in having more friable subsoils that are yellow or brownish-yellow in color. Cherty limestones as the Hillsdale member give rise to Frederick cherty silt loam which differs from the type in having a scattering of angular fragments on the surface and throughout the profile. Associated with Frankstown and Frederick soils, but on smoother relief is a small area of Pickaway silt loam that is mottled and slightly plastic in the subsoil. The surface soil is gray or grayish-yellow in color. The soils of the limestone valley dominate the agriculture of the county and are the most productive.

Directly overlying the Greenbrier Formation is the Mauch Chunk Series comprising in ascending stratigraphic order the Bluefield, Hinton, Princeton Conglomerate, and Bluestone Groups. (*) The Bluefield Group occurs as a wide belt running in a southwest-northeast direction throughout the central portion of the county. It is dominantly shaly, comprising yellow and greenish-gray shales together with some interbedded impure limestone. Generally the tops of ridges are capped with sandstone. At the junction of the Greenbrier Series with the Bluefield Group and including the shaly and limestone horizons, the material is very heterogeneous. The soil that has developed from this mass is the Westmoreland. It possesses a grayish-yellow or brownish-yellow surface soil and a yellow-brown friable subsoil. A smooth phase has been recognized in addition to the type soil. Westmoreland silt loam possesses a characteristic surface relief. In many places it is limited in profile development due to the hilly to steep relief.

(*)For a description of these members as well as other geological formations the reader is referred to the West Virginia Geological Survey report and map of Greenbrier County by Paul H. Price and E. T. Heck; West Virginia Geological Survey, Morgantown, West Virginia.

The Indian-red or purplish-red shales which are more or less calcareous together with some embedded limestone give rise to the Upshur soils. This parent material occurs in the Bluefield and Hinton Groups of the Mauch Chunk Series and in the Maccrady Series which directly underlies the Greenbrier Series. The surface soil of the Upshur series is reddish-brown and the subsoil is purplish-red. Much of the Upshur soils are limited in profile development due to the steep relief that they occupy. Where the red shales are intermixed with light-colored calcareous shales and embedded limestones, the resulting soil is mapped as Belmont. An intermixing of red shales with light-colored non-calcareous shales and sandstone which can not be separated into a definite soil type, leads to Upshur-Dekalb or Upshur-Clymer complexes. These complexes have been called Meigs in surrounding counties.

The Dekalb soils are developed by soil-forming processes from the weathered products of sandstones and light-colored non-calcareous shales on the less stony areas of the Bluestone Group, Pottsville, Pocono, Chemung, and Portage Series. The Bluestone Group of the Mauch Chunk Series and the Pottsville Series occur chiefly in the northwestern part of the county. The Pocono Series outcrops along Greenbrier River, on Brush Ridge, and along Meadow Creek in the northeastern part of the county. The Chemung and Portage Series belong to the Devonian Period which preceded the Mississippian. These formations occur in the eastern part of the county. The surface soils of the Dekalb are grayish-yellow and the subsoils are light-yellow or brownish-yellow in color. In general the Dekalb is a shallow soil having fragments of the underlying rock or shale scattered over the surface. This limited profile development is due to the relief which is dominantly steep to very steep. A few smoother areas occur on the tops of ridges at high elevations. The soils of such areas exhibit to a marked degree the result of podzolic processes involved in their development.

Much of the New River Group of the Pottsville Series in the northern part of the county is mapped as Rough stony land (Dekalb soil material). This area is a part of the western

plateau section, and has some fairly level summit areas. However, the land is not suitable for farming because the surface is strewn with boulders.

Closely related to and resembling the Dekalb soils are the Clymer soils. They are developed from the same parent materials, but occur on smoother relief. The loam type occurs on the tops of ridges that are capped with sandstone. The silt loam type generally occurs at lower elevations, and is developed from sandstone and shale material. In the early soil survey mapping, such areas were included with the Dekalb soils. Recently they have been separated from this series because of the deeper profile development and better agricultural adaptation.

The Marcellus Series occurs in the eastern part of the county as a continuous narrow belt occupying the lower mountain slopes and low rounded hills immediately adjacent to the small streams. This series is composed for the most part of finely laminated shales from which is developed Berks shaly silt loam. This is a very shallow soil and is non-agricultural. The surface soil is light-yellow or brownish-yellow in color, and the subsoil is yellowish-brown or brownish-yellow tinged with red.

Below the Marcellus Series are the Oriskany and Helderberg Series. These outcrop on Coles and Beaver Lick Mountains. The Huntersville Chert member of the Oriskany Series contains a small amount of lime and together with the siliceous limestones of the Helderberg gives the Elliber soils. Where not too stony the Elliber soil makes better grass land than surrounding areas of Dekalb or Berks soils. Weathering of the parent material leaves the chert fragments strewn over the surface and throughout the profile. Virgin areas of Elliber soils have a mat of organic matter on the surface which may be 3 or 4 inches thick. The surface soil is gray or grayish-yellow, and the subsoil is brownish-yellow or yellowish-brown. The purer limestone members of the Helderberg Series give rise to Hagerstown soil. Such areas are inextensive and have been included in with the Frederick soils.

In the eastern part of the county rocks of Silurian age are exposed. These are unimportant as far as soils are concerned because the areas are too stony, and are mapped chiefly as Rough stony land.

The soils developed on terraces include the Elk, Holston, Monongahela, and Sequatchie. These soils differ from each other not only in the character of the parent material, but also in the stage of maturity to which they have developed. The youngest of the group is Sequatchie loam. It resembles the Pope soil which occurs on the flood-plain. Elk silt loam is not a fully mature soil. The parent material for this soil is old alluvium from limestone uplands and to a lesser degree from Upshur soils. Elk silt loam as mapped is light-brown in color throughout the profile. The parent materials of the Sequatchie, Monongahela, and Holston soils were washed from areas of Dekalb soils. Monongahela silt loam is a poorly drained soil. It resembles Philo silt loam which occurs on the flood-plain. Holston loam is the most mature soil of this group. It is highly leached and possesses a gray or grayish-yellow surface soil with a light-yellow subsoil.

The alluvial soils include the Moshannon, Pope, Philo, and Atkins. They occur on the flood-plain, and are subject to frequent overflow resulting in deposition of new material. They have not developed a profile because the parent material has not been in place sufficiently long to be altered by the normal soil-forming processes of the region. The Pope and Philo soils resemble each other in the color of the surface soil, being light-brown or brownish-yellow. Philo differs from Pope in that it becomes mottled with gray and rust-brown at depths of 14 to 16 inches. Atkins is a poorly drained soil and is gray throughout the profile. Much of it is marshy throughout the year. Moshannon silt loam is one of the most productive soils. The alluvium has been washed from Upshur and limestone underlain soils. The color of the Moshannon soil resembles the Upshur soils.

CHAPTER XIII.

MINERAL WATERS, WATER-POWER, IRON ORE, MANGANESE, AND PRECIOUS METALS.

MINERAL WATERS.

GENERAL STATEMENT.

In Greenbrier, as in most of the counties in West Virginia lying within the limits of the folded Allegheny Mountains, there are numerous springs, most of which carry sufficient minerals in solution to be classified as mineral springs. Some of the minerals, in several of the springs, precipitate out upon reaching the surface and discolor the spring basins. This fact has resulted in the application of many descriptive terms such as "Blue Sulphur," "Black Sulphur," etc.

Some of these waters have long been used for medicinal purposes. The waters of the White Sulphur Springs are being used on a large scale for this purpose at the present time.

As reported by Price and others[1] some of the springs of the county are reported to be high in salt and salt was manufactured from water obtained from shallow wells in the early part of the nineteenth century. The salt was manufactured at two localities along the Greenbrier River, one being on the east side of the river three miles below Spring Creek and four miles upstream from Anthony Station. The other locality was one mile upstream from Renick P. O., on an island at Burr Ford. Both localities produced the brine from rocks of the Pocono Series. At the present time there are several known salt licks in the county.

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[1]Price, Paul H., Hare, C. E., McCue, J. B., and Hoskins, Homer A., Salt Brines of West Virginia, W. Va. Geol. Sur., Vol. VIII, pp. 31-2; 1937.

MINERAL SPRINGS.

Much of the data presented in this section has been published in an earlier publication of the Survey[1]. A description of individual springs with chemical analyses of some of the waters tested in the Survey laboratories follows:

Black Sulphur Spring.—This is one of the springs on the grounds of the famous Greenbrier Hotel at White Sulphur Springs. Over this spring has been built a beautiful pavilion that has been the subject of many poems and essays. (See Plate I.) The spring emerges from the Marcellus Shales but it appears likely that the actual aquifer is the Oriskany which would be 300 to 500 feet below the surface at this point.

Certain physical data and a chemical analysis of water from this spring follow:

Elevation: 1850′.
Geological Horizon: Marcellus Shale.
Temperature: Date observed, 6-3-35, 62.5° F.; 9-25-35, 63.0° F.
Rate of flow: Date observed, 6-3-35, 25 gallons per minute.
Owner: White Sulphur Springs, Inc., White Sulphur Springs, W. Va.
Analyst: Homer A. Hoskins.

Constituent.	Parts per Million.
Solids after evaporation	2218.0
Ignition loss	155.0
Silica (SiO_2)	17.0
Iron (Fe)	1.1
Calcium (Ca)	[illegible]
Magnesium (Mg)	[illegible]
Sodium (Na)	22.0
Potassium (K)	1.2
Bicarbonate (HCO_3)	205.0
Sulfate (SO_4)	1416.0
Chloride (Cl)	17.0
Nitrate (NO_3)	None
Hydrogen sulfide gas (H_2S)	12.5
Total of determined constituents	2255.8

White Sulphur Spring.—This is the spring that gives the famous resort its name. It is located about 100 feet south of the Black Sulphur Spring described above and is very similar to it in every respect. Certain physical data and a chemical analysis of the water from this spring follow:

[1]Price, Paul H., McCue, J. B., and Hoskins, Homer A., Springs of West Virginia, W. Va. Geol. Sur. Vol. VI; 1936.

Elevation: 1850′.
Geological Horizon: Marcellus Shale.
Temperature: Date observed, 9-25-35, 64° F.
Rate of flow: About 30 gallons per minute.
Owner: White Sulphur Springs, Inc., White Sulphur Springs, W. Va.
Analyst: Homer A. Hoskins.

Constituent.	Parts per Million.
Solids after evaporation	2057.0
Ignition loss	338.0
Silica (SiO_2)	17.0
Ferric oxide and Alumina $(Fe, Al)_2O_3$	2.0
Calcium (Ca)	362.0
Magnesium (Mg)	84.0
Sodium (Na) and Potassium (K)	66.0
Bicarbonate (HCO_3)	236.0
Sulfate (SO_4)	1355.0
Chloride (Cl)	16.0
Manganese (Mn)	0.01
Hydrogen sulfide gas (H_2S)	9.4
Total of determined constituents	2147.41

Probably no springs in the State have such a world-wide favorable reputation as do the ones described above. The flow from these springs is reputedly constant, with a constant temperature the year around. The fact that they are warmer than nearly all of the other surface springs of the county supports the thesis that the main source bed lies at some depth similar to the supposed position of the Oriskany at that locality.

White Sulphur Chalybeate Spring.—This is another of the famous springs on the grounds of the Greenbrier Hotel. The small flow, varying temperature, and nature of the water, all suggest that this water is ground water derived from the shale itself and not from the underlying Oriskany. Certain physical data and analyses of the water are given below:

Elevation: 1850′.
Geological Horizon: Marcellus Shale.
Temperature: Date observed, 6-3-35, 59° F.; 9-25-35, 64° F.
Rate of flow: Date observed, 6-3-35, 0.5 gallon per minute.
Owner, White Sulphur Springs, Inc., White Sulphur Springs, W. Va.
Analyst: Homer A. Hoskins.

Constituent.	Parts per Million.
Solids after evaporation	88.0
Ignition loss	16.0
Silica (SiO_2)	4.0
Iron (Fe)	4.5
Calcium (Ca)	7.0
Magnesium (Mg)	1.9
Sodium (Na)	2.4

Potassium (K)	1.6
Bicarbonate (HCO_3)	Acid
Sulfate (SO_4)	43.0
Chloride (Cl)	Trace
Nitrate (NO_3)	None
Hydrogen sulfide gas (H_2S)	None
Total of determined constituents	64.4

Remarks: This water is acid.

Comments: Of all the samples analyzed by the Survey, this is the only one found to be acid. The water is bottled and sold by the owners and considerable use is made of it on the premises. Much mention of this spring is found in the literature, but the following analysis by Froehling & Robertson, Richmond, Va., is the only one observed.

Constituent.	Parts per Million.
Silica (SiO_2)	2.3
Alumina (Al_2O_3)	2.0
Iron (Fe)	8.29
Calcium (Ca)	18.46
Magnesium (Mg)	1.54
Sodium (Na)	3.64
Potassium (K)	0.49
Bicarbonate (HCO_3)	21.0
Sulfate (SO_4)	52.89
Chloride (Cl)	3.55
Phosphate (PO_4)	0.57
Manganese (Mn)	0.9
Strontium (Sr)	0.715
Iodine (I)	0.007
Total of determined constituents	116.452

Remarks: Recalculated to free radicals by B. R. Drake from folder issued by the owners.

Blue Sulphur Springs. This spring is situated in a meadow beside the town of the same name, nine miles north of Alderson. It is reported to have once been a natural fountain that spurted vertically from the ground and a famous buffalo-lick. An early owner caused gravel to be dumped into the spring until it became a placid pool. In the early part of the nineteenth century many improvements were made around the spring, including a hotel and fifteen or twenty bath-houses. These buildings were burned during the Civil War and never rebuilt. In addition to the other improvements a pavilion was built over the spring and this still remains to-day. (See Plate LII). It is thought by some that this is the first place in the United States

PLATE L.—The Black Sulphur Spring at White Sulphur Springs. This lovely pavilion is situated just in the rear of the Greenbrier Hotel. The spring rises in the center, and the waters from the other springs are brought to the dispensing fountain where all who wish may drink of them freely. This is said to be the oldest spring pavilion in the United States, being erected about 1818. Photo. by Cummins.

PLATE LI.—Alvon Springs, spring-house, pump-house, and bottling-house owned by White Sulphur Springs, Inc. This is the source of the water used in the town of White Sulphur Springs. View looking northeast.

PLATE LII.—Blue Sulphur Springs. The pavilion shown above is over one hundred years old, mute reminder when this spring was the site of a famous resort. The hotel and bath-houses were destroyed during the Civil War and never rebuilt.

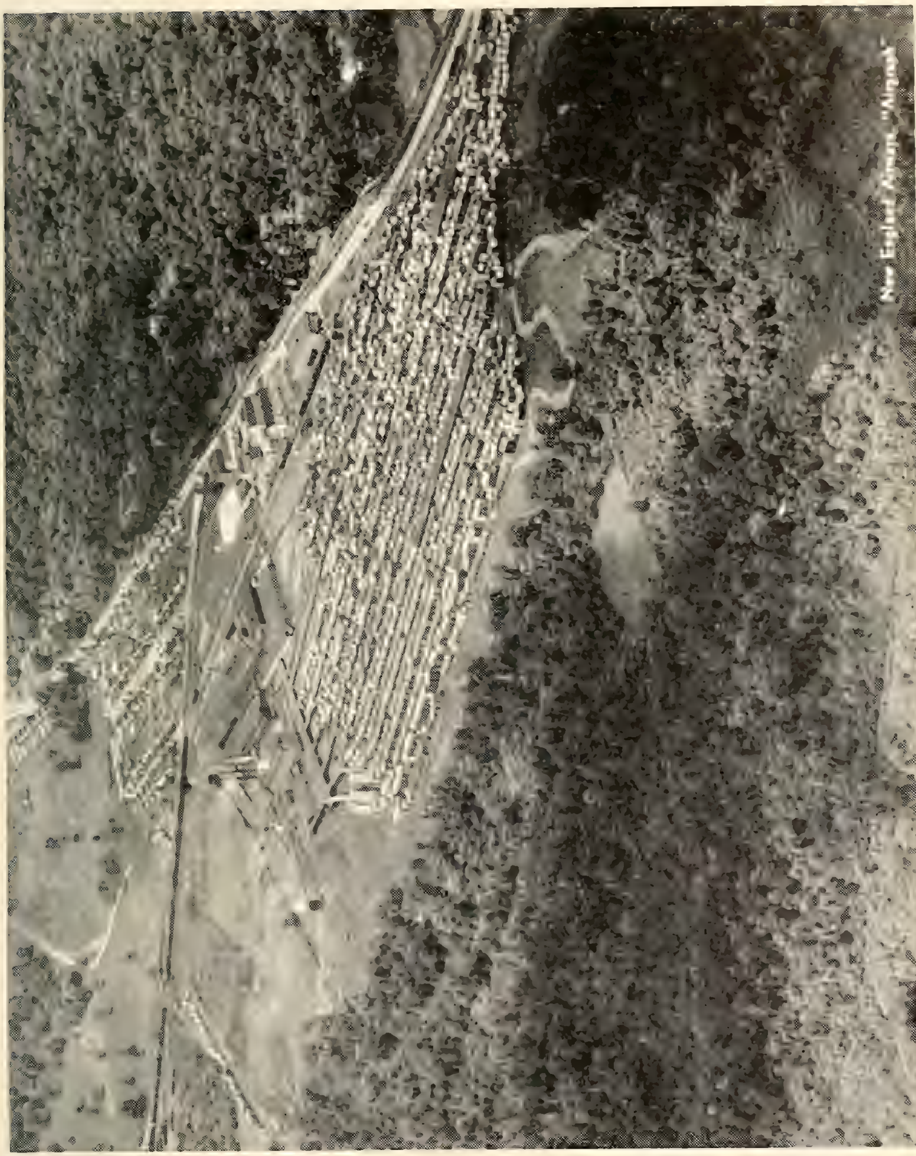

PLATE LIII.—Airplane photograph of Rainelle and the lumber yards of the Meadow River Lumber Company.

to give mud-baths. The most probable source of the water is the Webster Springs or Edray Sandstone. Certain physical data and a chemical analysis are given below:

Elevation: 1670′.
Geological Horizon: Bluefield Group Shale.
Temperature: Date observed, 6-3-35, 52.7° F.; 10-3-35, 58.0° F.
Rate of flow: Date observed, 6-3-35, 6 gallons per minute; 10-3-35, 6 gallons per minute.
Owner: Buster Heirs, Address A. M. Buster, Blue Sulphur Springs, W. Va.
Analyst: Homer A. Hoskins.

Constituent.	Parts per Million.
Solids after evaporation	1652.0
Ignition loss	121.0
Silica (SiO_2)	24.0
Iron (Fe)	0.24
Calcium (Ca)	299.0
Magnesium (Mg)	49.0
Sodium (Na)	119.0
Potassium (K)	4.0
Bicarbonate (HCO_3)	190.0
Sulfate (SO_4)	815.0
Chloride (Cl)	58.0
Nitrate (NO_3)	None
Manganese (Mn)	0.02
Hydrogen sulfide gas (H_2S)	7.2
Total of determined constituents	1565.46

Alvon Springs Nos. 1 and 2.—These springs are located on the south side of Anthony Creek, 0.5 mile west of Alvon. They provide the main source of water-supply for the town of White Sulphur Springs. In times of large demand the supply of water is supplemented by the Alvon Spring No. 3 and rarely by Alvon Spring No. 4, which springs will be described on a subsequent page. All of these springs are carefully protected in every way. Plate LI shows the spring-house over Nos. 1 and 2, the pump-house, and bottling-house erected just west of Alvon by the White Sulphur Springs, Inc.

As shown by the analysis below, the water is exceptionally pure and it is reported that the quality of this water does not vary materially. The water emerges from near the base of the Helderberg and although the point of emergence of the water is enclosed in such a manner that it can not readily be examined in detail, it appears to be limestone. As a rule limestone water is comparatively high in mineral content and the

answer in this case may be that the water has a good part of its course through the Clifton Forge Sandstone. This sandstone belongs at about this horizon as shown in the Alvon Section, page 206, but it was not observed at the spring.

The Greenbrier Hotel makes extensive use of this water in its baths, in making ginger ale and carbonated water, and it is bottled for sale. The Chesapeake and Ohio Railroad serves this water on all its dining-cars.

Certain physical data and a chemical analysis are given below:

Elevation: 1955′.
Geological Horizon: Helderberg Limestone.
Temperature: Date observed, 6-3-35, 57° F.; 9-25-35, 54° F.; 12-4-35, 57° F.
Rate of flow: Date observed, 6-3-35, 900 gallons per minute; 12-4-35, 400 gallons per minute.
Owner: White Sulphur Springs, Inc., White Sulphur Springs, W. Va.
Analyst: Homer A. Hoskins.

Constituent.	Parts per Million.
Solids after evaporation	88.0
Ignition loss	8.0
Silica (SiO_2)	7.5
Iron (Fe)	0.15
Calcium (Ca)	25.0
Magnesium (Mg)	4.5
Sodium (Na)	2.2
Potassium (K)	2.2
Bicarbonate (HCO_3)	88.0
Sulfate (SO_4)	5.1
Chloride (Cl)	1.9
Nitrate (NO_3)	0.25
Manganese (Mn)	Very faint trace
Hydrogen sulfide gas (H_2S)	None
Total of determined constituents	136.8

Remarks: A very pure limestone water.

Alvon Spring No. 3.—This spring is located about 100 yards west of Nos. 1 and 2. It emerges from rocks of the Salina Series but the water appears to be very similar to that issuing from springs one and two. The spring is at a slightly lower elevation than those to the east. It appears probable that these three springs have a common source but there is little evidence to prove this contention. At the time Spring No. 3 was observed (December 4, 1935), the flow was estimated at 300 gallons per minute with a temperature of 53 degrees Fahren-

heit. As noted above, the water from this spring is used when the supply from Nos. 1 and 2 is insufficient to meet the demand.

Alvon Spring No. 4.—This spring is located on the east side of Beaver Lick Mountain, on the west bank of Anthony Creek, 0.3 mile north of Alvon. It had an estimated flow of 350 gallons per minute with a temperature of 52 degrees Fahrenheit on December 5, 1935. It is connected by pipe-line to the pump-house west of Alvon but is rarely used. The water apparently emerges from near the base of the Helderberg and is reported to be less pure than either of the other three springs operated by White Sulphur Springs, Inc.

Anthony Cave Spring.—This spring is located on the north side of Anthony Creek about 0.4 mile west of Alvon, just below the small cave formed by the arch of the Keefer Sandstone. It emerges from Clinton rocks and is just above stream level. On December 4, 1935, the spring had an estimated flow of 500 gallons per minute and a temperature of 60 degrees Fahrenheit. The spring is owned by Mr. Charles Mathews of Alvon, W. Va. The water is quite pure and has a pleasant taste.

Fish Hatchery Spring.—This spring is located on the north side of Spring Run, 0.2 mile northeast of the city limits of White Sulphur Springs. It supplies the water for the large fish hatchery established at White Sulphur Springs by the United States Government and the spring is owned by them. The estimated flow is from 6,000 to 7,000 gallons a minute, with a temperature of 54 degrees Fahrenheit when recorded December 4, 1935. The underlying rocks are concealed by alluvial deposits around the spring but it is probable that the Oriskany or perhaps the Helderberg serves as the aquifer.

Reed Spring.—Located 2.9 miles north of White Sulphur Springs, this spring is one of the numerous small springs in and around White Sulphur. When visited on December 4, 1935, this spring had an estimated flow of four gallons per minute and a temperature of 55 degrees Fahrenheit. This spring emerges from the Marcellus and is non-gaseous. Inquiries concerning this spring should be addressed to Mr. A. E. Huddleston, White Sulphur Springs, W. Va.

Atkinson Spring.—This small spring is located in the northwest part of White Sulphur Springs. It emerges from Oriskany rocks and had an estimated flow of one gallon per minute with a temperature of 55 degrees on December 4, 1935.

Magnesia Spring.—This is a small spring located just outside the western city limits of White Sulphur Springs. It emerges from Oriskany rocks and had an estimated flow of two gallons per minute with a temperature of 49 degrees on December 5, 1935. It is owned by the banks of Lewisburg and White Sulphur Springs.

Alum Spring.—This small spring is located along the Chesapeake and Ohio Railroad about 0.5 mile southwest of the city limits of White Sulphur Springs. It has an estimated flow of one gallon per minute and a winter temperature of 52 degrees Fahrenheit. The spring emerges from Portage sandy shales. It is owned by the Chesapeake and Ohio Railroad Company.

Other Springs.—Other than the above-described springs there are few of major importance. As inferred in the name of the village that was named for it, the spring at Columbia Sulphur Springs emits a strong sulphur water. The water emerges from Portage sandy shales. Several springs have been developed into beautiful road-side fountains by the State Road Commission. The emergence of some of the underground streams from the Greenbrier Limestone might be considered as mineral springs but they are not so considered in this report. It is sufficient to note that the water from these underground streams is variable in volume and quality.

WATER-POWER.

PRESENT DEVELOPMENT.

At the present time no utilization is being made of the many streams of Greenbrier County for hydroelectric power. Few of these streams offer attractive sites for such development. Some of the larger streams have been used for rafting logs and for supplying power to small mills such as those used for grinding grain.

GREENBRIER RIVER.

The drainage basin of the Greenbrier River has already been described, pages 46-81, together with stream gages which have been published in the various Water-Supply Papers of the United States Geological Survey. Other than near its source this river has a moderate rate of fall (see gradient of Greenbrier River, page 47), and along its course are several narrows where dams could be built with secure foundations. Furthermore the rate of silting would be comparatively slow as much of its drainage area is covered with a heavy growth of vegetation.

The chief objection to the placing of dams along this stream, which in itself is perhaps prohibitive, is the large property damage that would ensue. North of Caldwell the chief obstacle would be the tracks of the Chesapeake and Ohio Railroad. These tracks are located in most cases from 15 to 30 feet above the stream so that these tracks would have to be relocated. West of Caldwell, in addition to the main line tracks of the Chesapeake and Ohio Railroad, towns and valuable limestone deposits would also be flooded by water from high dams.

ANTHONY CREEK.

This stream offers the best prospects for hydroelectric development of any in the county. The narrow gorge at its mouth would permit the building of a dam at the least possible cost. The drainage area is comparatively large and property damage would be low. In the table given below is an estimate of the amount of power that could be developed from this stream. It would appear that the minimum of 690 horse-power shown in the table is too low. Due to the many large springs along the stream the supply of water would not vary with the seasons to the extent that most streams would. This fact would help to offset the comparatively small storage space available along the lower course of this stream.

The greatest objection that this stream has for private development is that the entire drainage basin lies within the purchase area of the Monongahela National Forest and much of this land has already been purchased.

HOWARD CREEK.

A good site for a dam is available on Howard Creek. The drainage area, though small, would be adequate for some purposes. The storage area would be larger than that along Anthony Creek but here again the property damage would be high. A high dam would flood the Chesapeake and Ohio Railroad tracks and the highway would have to be relocated.

MUDDY CREEK.

Muddy Creek would not be satisfactory as a source of hydroelectric power due to its small drainage area and the lack of a good site for a dam.

MEADOW RIVER.

Of the streams in the northwestern part of the county, Meadow River is the only one that appears favorable for commercial development of hydroelectric power. The drainage area is large and there are several places where dams would not have to be excessively wide. Property damage might be high, however, since the tracks of the Nicholas, Fayette, and Greenbrier Railroad would have to be relocated. The best sites for dams would also involve coal-bearing rocks which might add to the amount of property damage.

INDICATED HORSE-POWER OF STREAMS.

The following table gives the indicated horse-power developed by streams in Greenbrier County, in whole or in part, having been taken from Tables 3 and 4, pages 401 and 402, of the Semi-Centennial History of West Virginia by Dr. J. Morton Callahan, being part of a special article on Water-Power Resources of West Virginia by A. H. Horton, District Engineer, Water Resources Branch, United States Geological Survey. For stream lengths, total fall, rate of fall, etc., computed on the latest United States Geological Survey maps, see "Table of Stream Data" in this report, pages 39-42.

Indicated Horse-Power Developed by Greenbrier River.

Section of River: From	To	Length. Mi.	Mean Drainage Area. Sq. Mi.	Minimum Discharge. Sec.-ft.	Assumed Discharge for Maximum Development. Sec.-ft.	Total Fall Feet	Minimum Horse-Power.	Assumed Maximum Development. Horse-Power.	Horse-power available from storage for 12 months.	6 months.	3 months.
Source	Below East Fork	18	a130	21	53	1,000	483	1,220	....	....	....
Below East Fork	Above North Fork	13	148	25	60	260	598	1,430	....	....	....
Below North Fork	Above Knapp Creek	21	326	54	132	c310	1.540	3,760	7,540	15,100	30,200
Below Knapp Creek	Above Anthony Creek	40	670	87	271	b300	2,400	7,840	6,820	13,600	27,200
Below Anthony Creek	Above Second Creek	23	1,100	122	446	b220	2,470	9,020	21,400	42,800	85,600
Below Second Creek	Above Mouth	36	1,460	133	590	260	3,180	14,100	34,100	68,800	137,600
Total		151	....	....	....	2,350	10,671	37,010	70,160	140,300	280,600

a. Total area. b. Fall reduced to 145 ft, by proposed Lewisburg reservoir. c. Fall reduced to 160 ft. by proposed Pocahontas reservoir.

Indicated Horse-Power Developed by Tributaries of Greenbrier River.

Stream	From	To	Length. Mi.	Drainage Area at Mouth. Sq. Mi.	Minimum Discharge. Sec.-ft.	Assumed Discharge for Maximum Development. Sec.-ft.	Total Fall. Feet.	Minimum Horse-power.	Assumed Maximum Development. Horse-power.
North Fork Greenbrier	Source	Mouth	15	87	14	35	1,500	483	1,210
Knapp Creek	Source	Mouth	27	121	20	49	1,300	598	1,470
Anthony Creek	Source	Mouth	25	148	25	60	1,200	690	1,660
Howard Creek	Source	Mouth	18	90	15	36	1,000	345	828
Second Creek	Source	Mouth	24	120	20	48	1,500	690	1,660
Muddy Creek	Source	Mouth	16	70	12	28	1,000	276	644
Totals								3,082	7,472

IRON ORE.

GENERAL STATEMENT.

The principal prospecting horizons for iron ore in Greenbrier County are the Oriskany and Clinton, the former being of Devonian age and containing pink and brown limonite while the latter is of Silurian age and the ore is chiefly red hematite. Nearly all rocks contain an appreciable amount of iron and it is quite apparent in some by their red or brown color. In most red rocks such as those of the Mauch Chunk the iron is so disseminated that they are valueless as sources of iron.

The outcrops of the Oriskany and Clinton rocks are confined to the Browns Mountain Anticline area and are distributed in a narrow band from White Sulphur Springs, northeast into Pocahontas County. The iron ore of the Oriskany is not found every place that the Oriskany outcrops but is found only in pockets or zones where conditions have caused the precipitation of iron from waters circulating through the sandstone (Ridgeley). The Clinton ores, however, are inherent in the rocks and may be found wherever the proper horizon outcrops. Of the two, the Oriskany is the more important since the area in which the Clinton outcrops is very small.

During the latter half of the nineteenth century and the early part of the present century, great interest was taken in the West Virginia iron ores, but the discovery and operation of vast quantities of a more accessible and purer grade ore in the Great Lakes region prevented their development.

ORISKANY IRON ORE PROSPECTS AND EXPOSURES.

About the year 1900 a considerable amount of prospecting was done along Beaver Lick Mountain in Greenbrier and Pocahontas Counties, which included trenching and pits across the strike of the rocks. In 1907 and 1908 further prospecting was done under the direction of Mr. John Fulton, a mining geologist, of Johnstown, Pennsylvania. At the present time little evidence is seen where the prospecting was done, but fortunately valuable information about this area was given by Dr. G. P. Grimsley and published in Volume IV of the West Virginia Geological Survey Reports. That information which pertains to Greenbrier County will be included on subsequent pages of this report.

"To the northeast of White Sulphur Springs is a long mountain trending northeast, which is divided by cross valleys into shorter ridges all of which are claimed to contain valuable Oriskany ore deposits. The first of these ridges is known as Bobs Ridge and was prospected some years ago with a few openings near its crest which are reported as showing a promising body of ore. Next to the north is Coles Mountain with ore boulders but no openings. To the north of the Anthony Creek gap is the Beaver Lick Mountain, on which ore openings were made 8 or 10 years ago, and a considerable amount of prospect work done especially near the north line of the county in the North Fork country. During the past year (1907) and at the present time, active prospect work is in progress under the direction of Mr. John Fulton, the well-known mining geologist of Pennsylvania. Mr. Fulton has kindly given the writer much valuable information about this area, both before and since the study of the region for the present report. The ore openings on the Beaver Lick Mountain will now be described.

"**Fertig Prospect.**—The Fertig prospect is located on the Anthony Creek slope of the Beaver Lick Mountain, 20 miles northeast of White Sulphur, or ten miles north of Anthony Creek gap. It is located on the side of a small ravine cutting into the mountain, 1¼ miles to the west of the lumber railroad and 570 feet higher than this road.

"This prospect is an open cut about 30 or 40 feet wide, 75 feet long, and 20 feet deep. It shows a mass of rounded boulders above resting on large rounded masses of ore apparently in place, and associated with flint and limestone fragments. The foot-wall is yellowish-brown irregular sandstone, the Oriskany, which trends N. 30° E. and dips 30 degrees in a direction S. 50° E. The hanging-wall is not clearly marked, but is apparently a weathered limestone which near the ore body is in form of small fragments associated with flint. A trench driven 20 feet across this material showed little change, but along the mountain side the limestone boulders are numerous.

"The ore body has been opened to a depth of 20 feet and in width varies from 25 to 35 feet. The angular flint fragments are found in some of the blocks surrounded by ore. This ore is porous or honeycomb with the open spaces filled with fine soft sand and almost black in color. The following analyses of this ore are given by Mr. Fulton, the first made for a report by Mr. Lehman, and the second for Mr. Fulton's report. The third analysis was made in the Survey laboratory from a sample taken in the course of the present study:

	Lehman Report.	Fulton Report.	Survey.
Metallic iron	61.53	60.20	58.23
Moisture	....	....	0.27
Loss on ignition	....	7.67	7.53
Silica	1.55	2.80	4.56
Iron oxide	....	....	83.19
Lime oxide	....	....	0.24
Manganese dioxide	....	0.17	0.035
Sulphur	....	....	0.07
Phosphorus	0.492	0.342	0.61
Titanium oxide	....	....	0.36

"**Perry Prospect.**—One and a half miles northeast of the Fertig just over the county line in Pocahontas County, is the Perry opening, 450 feet above the railroad track and a mile and a quarter distant. The

ore has been opened in a large cut 70 feet wide and 15 to 25 feet deep, showing 50 feet of ore. The foot-wall is the brownish Oriskany sandstone which dips 36 to 40 degrees in direction N. 50° E., while on the hill above the ore are limestone and flint fragments.

"The ore is very porous and almost steel gray in color, but weathers to a red soft ore on the surface. It is free from sand and clay and appears to be of good quality. The boulders of ore are found especially abundant at a point 180 feet lower in a ravine indicating the possibility of a very large ore body in this hill.

"The composition of the ore according to the Lehman, Fulton, and Survey analyses is given below:

	Lehman Report.	Fulton Report.	Survey.
Metallic iron	53.31	53.20	59.23
Moisture	....	....	0.23
Loss on ignition	....	7.22	5.02
Silica	7.60	13.50	7.24
Iron oxide	....	....	84.67
Lime oxide	....	....	0.24
Manganese dioxide	....	0.18	0.02
Sulphur	....	....	0.22
Phosphorus	....	....	0.19
Titanium oxide	....	....	0.07

"**Dan Prospect.**—The Dan opening is located 1¾ miles northeast of the Perry and one and a half miles west of the railroad and 325 feet higher. A large open cut or trench gives a section of the ore body. In some former prospect work, four tunnels were driven in this trench to intersect the ore body. The top tunnel is 15 feet above the second which is 20 feet above the third, and the fourth is 45 feet lower.

"The two upper tunnels were about the level of the ore body but were driven in the wrong direction. The two lower tunnels were made below the ore body in the foot-wall. The bottom tunnel was 380 feet long and runs in a N. 30° W. direction and no ore appears in its walls. A considerable quantity of ore was blasted from the ore body in the open cut, but the tunnel work was apparently a failure.

"The foot-wall of the ore body is a yellowish sandstone weathering to sand, and the ore is mixed with it in a nodular form in its upper portion. This sandstone which is the Oriskany, trends N. 30° E., with a dip of 30 degrees in direction S. 50° E. The ore body shows in this opening with a thickness of 40 feet. It is dark brown in color, compact in texture except for scattered small pores. Its composition is shown by the following analyses:

	Lehman Report.	Fulton Report.	Survey.
Metallic iron	49.25	50.60	58.93
Moisture	....	....	0.19
Loss on ignition	....	....	11.26
Silica	8.90	13.41	2.01
Iron oxide	....	....	84.22
Lime oxide	....	....	0.20
Manganese dioxide	....	0.11	0.02
Sulphur	....	....	0.02
Phosphorus	0.336	0.402	0.72
Titanium oxide	....	....	0.07

"**Little Creek Prospect.**—The Little Creek openings are located near the southern end of Beaver Lick Mountain, one and three-fourths miles northeast of Anthony Creek gap, and on the western slope of the mountain. This location is about 12 miles northeast of White Sulphur, and has long been regarded as a most valuable prospect, with the ore body reported as 40 to 60 feet thick. The level of the lowest opening is 550 feet above the Anthony Creek valley to the east.

"Seven openings have been made, some of which show a promising body of ore, but they have not been made deep enough or extensive enough to form any safe conclusions as to the value of this ore body, and it would justify further work. The course of the ore in N. 20° to 30° E., and the dip at the lower opening is S. 50° E.

"In the first and lowest opening in the form of a long trench 6 to 7 feet deep small ore nodules are found in clay and sand which are streaked with iron, but no quantity of ore was observed. As the ore is followed to the northeast in the different trenches, nothing of value is found in the second; but in the third trench, there is a good body of ore in nodular form 18 to 20 feet wide, and opened to a depth of 8 feet. The level of this opening is 10 feet above the first.

"Forty-five feet higher is the fourth trench with similar boulders of ore. The fifth opening is 27 feet higher and shows the N. 30° E. trend with a dip to the southeast. The boulders have been opened to a depth of 4 feet and shows only small pieces of shelly ore, with angular pieces of white sandstone cemented by black iron. In the seventh opening, 27 feet higher no ore was seen, but numerous small blocks of brown and white sandstone. The top of the mountain 40 or 50 feet above, is composed of white sandstone.

"The ore as found in these trenches is a dark brown hematite with scattered openings lines with dark brown velvet ore, and has good weight. The following analyses are given of this ore in the Lehman and the Fulton reports. The Survey analysis was made from an average lot of the ore from the third opening:

	Lehman Report.	Fulton Report.	Survey.
Metallic iron	54.61	53.00	53.59
Moisture	....	11.50	0.30
Loss on ignition	....	....	10.50
Silica	8.50	7.84	9.40
Iron oxide	....	....	76.57
Lime oxide	....	....	0.22
Manganese dioxide	....	0.32	0.02
Sulphur	....	....	0.02
Phosphorus	0.42	0.676	0.61
Titanium oxide	....	....	0.07

"**Qualtity of Ore.**—The length of the outcrop as explored of this brown hematite ore on the eastern slope of the Beaver Lick Mountain is 12 miles. The thickness of the ore at the different openings is 30 to 50 feet. If allowance be made for loss of ore in the ravines and the thickness be assumed as 30 feet and worked to a depth of 100 feet, there would be along this slope 12x5280x30x100 (÷27)=7,000,000 cubic yards of ore. With a weight of 2½ tons to the cubic yard, there would be 17,500,000 tons of ore. If tho ore continues in the same way on the other side of the mountain as indicated in the few openings made, there would be a total of 35,000,000 tons of brown hematite ore. The depth of the ore will probably reach at least 200 feet which would double the above estimate."

In connection with the field work for this report, the above observations were largely verified and some additional information was obtained as follows:

What is now known as the old **May Mine (No. 13 on Map II)** is apparently at about the same location as the Fertig Prospect described by Grimsley. The ore is of two kinds. One type has a dull-red, jasper-like appearance, is very hard, and has a conchoidal fracture. A sample of this ore was collected and its chemical analysis is published in the Table of Iron Ore Analyses under No. 121-PH. The other type is a black or brown limonite with a "pipe-organ" structure. A sample of this ore was collected and its chemical analysis is published in the Table of Iron Ore Analyses under No. 122-PH.

It is reported that some ore was taken out of this mine and shipped to a furnace near Clifton Forge, Va. At the present time the outcrops are so covered with vegetation and debris that little can be added to the description of Grimsley for the Fertig Prospect.

It is also reported that test shipments of ore were made from a location that is apparently the same as the Perry Prospect described by Grimsley. This location was visited but exposures were unsatisfactory for sampling.

The Dan Prospect described by Grimsley is now known as the old **Dan Mine (No. 14 on Map II)**. The sandstone just over the main ore body of the Dan Mine appears to be the Ridgeley (Oriskany) but it is so badly broken and shattered that verification by fossils was impossibe. The ore mined is irregular and some of it extends into the sandstone in spurs or pockets. Like that in the May Mine, the ore is mainly of two types, the dull-red ore with conchoidal fracture and the dark-brown or black "pipe-organ" ore. There is also some spongy brown limonite. Samples of the three types of ore were taken and the chemical analyses are published in the Table of Iron Ore Analyses. No. 118-PH is the "pipe-organ" ore, No. 119-PH is the softer brown limonite, and No. 120-PH is the red, "jasper-like" ore.

It is reported that several cars of ore from this mine were shipped to a furnace near Clifton Forge, Va.

Mr. F. N. Hull, of Alvon, W. Va., sent a sample of Oriskany iron ore to the Survey that was collected on the north end of Coles Mountain. The result of chemical analysis of the sample is given in the Table of Iron Ore Analyses under No. 106-PH.

CLINTON ORES.

The outcrop of the Clinton Iron Ore is confined to Beaver Lick Mountain and since it is only a few feet above the White Medina its outcrop can readily be found from the outcrop of the latter as shown on Map II. The ore was only observed at two places along its outcrop in Greenbrier County and even these were so covered by vegetation that detailed examination was not possible. Near the southern limit of the outcrop of the White Medina a heavy red oolitic bed was noted outcropping just above (stratigraphically) the white quartzite but its thickness could not be determined. From its appearance it contains considerable iron but no analysis of the rock has been made.

Suffice to say that the small area of outcropping Clinton ore, its apparent silica content, and its inaccessibility preclude its commercial use at the present price of ore.

TABLE OF IRON ORE ANALYSES.

The following table shows the iron content of six representative samples of the Oriskany iron ore in this area. The analyses were made by Mr. Homer A. Hoskins in the Survey laboratories. No complete analyses were made but the amount of the silica, ferric oxide, alumina, manganese, and phosphoric acid contained in each sample shows the approximate purity of the ore for the major constituents. The description and location of the samples have been given on preceding pages:

Table of Iron Ore Analyses.

Sample No.	Name of Prospect or Location	Silica (SiO_2)	Ferric Iron (Fe_2O_3)	Alumina (Al_2O_3)	Manganese (MnO_2)	Lime (CaO)	Magnesia (MgO)	Alkalies (Na_2, K_2O)	Titanium (TiO_2)	Phosphoric Acid (P_2O_5)	Moisture	Loss on Ignition	Barium Oxide (BaO)	Sulphur	Total
106-PH	F. N. Hull, Alvon, Greenbrier Co.	12.39	74.25	0.89	2.38	0.18	None	Tr.	0.11	1.85	0.38	7.43	0.10	0.04	100.00
118-PH	Dan Mine, Pocahontas Co.	1.29	86.15	1.46	0.22	......	......	Tr.	0.43	0.96	0.54	8.00	......	......	99.93
119-PH	Dan Mine, Pocahontas Co.	33.09	11.32	36.09	0.07	......	1.15	Tr.	0.04	0.36	2.57	13.19	2.76	0.06	99.70
120-PH	Dan Mine, Pocahontas Co.	38.12	21.99	19.86	0.02	Tr.	0.60	......	0.06	0.34	0.82	......	0.11	0.66	93.60
121-PH	May Mine, Greenbrier Co.	1.43	90.72	Tr.	0.34	Tr.	......	......	......	......	0.7	7.29	......	......	100.48
122-PH	May Mine, Greenbrier Co.	3.14	87.10	Tr.	0.25	Tr.	......	......	......	......	0.55	8.67	......	......	99.71

MANGANESE.

GENERAL STATEMENT.

The manganese ore in Greenbrier County is apparently confined to the residual debris from rocks of Helderberg age. The ore is clearly a secondary concentration by circulating ground water. The original source of the manganese has been the subject of much debate. For similar deposits of ore Watson[3] has proposed that the manganese was originally deposited in the Devonian Shales, later dissolved by ground water and then deposited in the underlying rocks. Watson states, however, that a sample of the Devonian Shales collected by him showed no manganese. Reeves[4] has recently made a survey of the manganese deposits in eastern West Virginia. He concurs with Watson that the source of the manganese was probably the Devonian Shales.

One important objection to a common source for the iron ore and manganese ore, as proposed by Watson and elaborated on by Reeves, is that in Greenbrier County the two kinds of ore were never found merging into one another. The manganese ore is apparently confined to Helderberg rocks and the iron ore is apparently limited to the Oriskany[5] (and Clinton). A further objection to the Devonian Shales as a source of the manganese is that some of the manganese ore is found on or near the crests of mountains and these areas were probably stream divides before the rocks involved were first subjected to the effects of circulating meteoric waters.

It is the contention of Stose and Miser[6], who have made a detailed study of similar manganese are deposits of the adjoining territory of Virginia, that the manganese was originally deposited in greater quantities in certain beds than in others.

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[3]Watson, T. L., Mineral Resources of Virginia; Va. Jamestown Exposition Com., pp 408-410; 1907.

[4]Reeves, Frank, Manganese Deposits of Eastern West Virginia; W. Va. Geol. Sur., Mimeograph Bull. 6; 1935.

[5]In his report Reeves refers to the presence of manganese ore in the Oriskany in Greenbrier County. No mention is made of the Healing Springs Sandstone which closely resembles the Oriskany (Ridgeley) Sandstone. To the writers' knowledge manganese ore does not occur in the Oriskany of Greenbrier County.

[6]Stose, G. W. and Miser, H. D., Manganese Deposits of Western Virginia, Bull XXII, Va. Geol. Sur., pp. 52-55; 1922.

They do not contend that it was deposited as ore bodies but was disseminated in small particles through the beds and that it has since been dissolved by circulating ground waters as the rocks weathered and was redeposited in the same or adjacent beds in the concentrated form in which it is now found. They state that the accumulation probably took place at times of partial peneplanation when the streams were nearly base-leveled and the run-off was slight.

The writers are inclined to accept the theory of origin proposed by Stose and Miser, but recognize the possibility of conditions that would permit deep weathering and concentration of the ores without peneplanation.

The Oriskany is next above the Helderberg and since the Oriskany iron ore is also a concentration product of circulating water the iron ore and manganese ore are usually found in the same general areas. Because of this known association iron oxide, which is nearly black and may assume the botryoidal structure of psilomelane, is ofter mistaken for the latter[7].

Some manganese has been mined in Greenbrier County in at least three periods in the past. Mr. F. N. Hull reports that fourteen railroad car-loads of manganese ore were shipped from White Sulphur Springs about 1890 or 1891. The ore came from the top of Coles Mountain. As reported by Mr. Hull, two more car-loads of ore (mined on Coles Mountain) were shipped from White Sulphur Springs about 1906. According to Mr. Frank Reeves, 75 tons of manganese ore was mined from Coles Mountain in 1933 by the Jackson Iron Corporation and shipped to the Lavino Furnace Co., Sheridan, Pa.

The commercial possibilities of the manganese ore deposits of Greenbrier County remain doubtful. It has been proved that manganese ore of a good grade is present in the Bobs Ridge, Coles-Beaver Lick Mountain area, but whether it can be mined profitably is another question. The ore consists of nodules of manganese minerals, scattered through the residual clay and sand left by the weathering of rocks of Helderberg

[7]A simple way to distinguish the manganese mineral from the iron ore is to mark a piece of white quartz or quartzite with the mineral to determine the color of its powder or streak. If manganese, it will leave a very dark brown or black streak, while iron oxide leaves a reddish- or yellowish-brown streak.

age. The ore must be concentrated and washed. Large scale operations with washing appear to be the most feasible method. Only extensive prospecting can determine the extent of these deposits. The price of manganese will prove to be the controlling factor in their development.

MANGANESE PROSPECTS.

As stated above, some private prospecting for manganese ore in Greenbrier County was carried on in 1933. Unfortunately the field work for this report was interrupted and no opportunity was afforded to visit the prospects made during that year.

A reconnaissance survey of the manganese deposits of eastern West Virginia was made by Reeves[1] in the early summer of 1934. It is the writers' belief that Reeves confused the Healing Springs Sandstone with the Oriskany (Ridgeley) Sandstone and as a result he misinterpreted the structure of the Greenbrier area.

His descriptions of the manganese prospects in Greenbrier County are republished below with certain corrections inserted in parentheses:

"Mary Holyman Prospect.

"About 1½ miles northwest of Alvon post-office and 1,000 feet S. 18° W. from the bridge crossing Anthony Creek at the foot of the northwest flank of Coles Mountain, on the Mary Holyman farm, a Mr. Goshorn did some prespecting for manganese in 1924. A tunnel was driven several feet into the base of the mountain and about 150 feet above Anthony Creek. This tunnel was caved at the time of the writer's visit, but, to judge from the dump, a considerable amount of nodular psilomelane had been encountered in a sandy clay, apparently the product of weathering of the Ridgeley (Healing Springs) Sandstone, which at this locality is overturned, being inclined 45° S. E. Two other pits 100 to 150 feet farther west in the Ridgeley show very little manganese. About 400 feet to the east manganese pellets were encountered in clay in a limestone of the Helderberg Group. In adjacent localities along the strike of the Ridgeley, where this formation crops out higher on the flank of the mountain, it contains iron ore in considerable quantities. Two miles to the northeast, along the strike, another prospect pit in the Ridgeley encountered a highly mineralized zone of hematite and limonite. On top of the ridge, 100 feet higher, the Ridgeley (Healing Springs) contains an appreciable amount of man-

[1]Reeves, Frank, Manganese Deposits of Eastern West Virginia, W. Va. Geol. Sur. Mimeograph Bull. 6, pp. 15-17; 1935.

ganese in joints and impregnating the sandstone, with no iron minerals. To the southwest there is also considerable iron ore in the Oriskany rocks, and the first showing of manganese is at the Waggoner mine, 1½ miles southwest of the Holyman prospect.

"Waggoner Mine.

"On Coles Mountain 2 miles southwest of Alvon post-office there is an old prospect pit of roughly circular outline, about 40 feet in diameter and about 20 feet deep. It is about 200 feet northwest of and about 50 feet below the crest of the ridge, which is here rather narrow. It lies about 3,000 feet above sea-level and 1,000 feet above the base of the mountain. No rock material other than a residual sandy clay was encountered in the pit. The manganese minerals chiefly psilomelane, occur in small nodular masses and small pellets or impregnated sandy clay that is probably a weathered product of a Helderberg limestone. The Ridgeley (Healing Springs?) Sandstone caps the ridge above the shaft, and Helderberg Limestone has been encountered in prospecting 1,000 feet or so to the southwest along the strike of the formation. From other observations near the shaft and along both flanks of Coles Mountain it is evident that there is a strike fault running near the crest of the ridge and another one on the southeast flank. A cross-section showing the geology of the ridge is given in Figure 2. (Not reproduced; the authors question the presence of the faults; see Cross-Section B—B' on Map II in Atlas.)

"The pit was first opened about 50 years ago by a Mr. Waggoner, who was prospecting for iron ore. The property was later acquired by the Glenmore Iron Estate, and 3 small car-loads of ore were shipped to the Carnegie Steel Company in the early nineties. J. E. Woodsen and others acquired a prospector's lease on the property in 1930 and did further exploring around the old pit. In 1933 the Jackson Iron Corporation leased the property and did considerable prospecting along Coles Mountain and some exploring in and around the old prospect pit. A washer was erected on Anthony Creek 1 mile north, (0.1 mile southwest?), of Alvon and 3 miles by road from the mine. A considerable amount of the manganese-bearing clay from the dump of the mine was hauled to this washer, and 75 tons of the ore was washed and two small car-loads shipped to the Lavino Furnace Co., Sheridan, Pa., during the summer of 1933.

"The following analyses of the ore shipped from the mine were obtained through the courtesy of R. W. Montague, of Richmond, Va.:

"Analyses of manganese ore shipped from Waggoner Mine, near Alvon, Greenbrier County.

	1 (19 tons)	2 (14 tons)	3 (14 tons)	4 (30 tons)	5
Silica	3.50	....	2.90	....	....
Phosphorus	.08	....	.08	0.19	....
Iron	.60	0.20	.20	9.49	....
Manganese	48.43	49.96	50.16	41.08	51.69

"The commercial possibilities of the deposit on Coles Mountain are doubtful. The recoverable material, though of good grade, is so widely dispersed in the residual clay that the cost of washing would be rather high. If the body of ore-bearing clay were large enough to

warrant the installation of a washer at the mine and the use of steam shovels to mine the clay the deposit might be worked with some success when the price of manganese is high, but it is doubtful whether the ore body occurs in sufficient bulk to warrant the installation of a plant that would operate on a large scale. Prospecting in this vicinity does not indicate a large deposit.

"Hall Prospect.

"About 3½ miles southwest of Alvon post-office and 2 miles southwest of the Waggoner mine considerable prospecting has been done in a saddle along the crest of Coles Mountain, on what is known as the 'Hall property.' The Jackson Iron Corporation did most of this prospecting in the summer of 1933, excavating several ditches and pits. The dumps from these excavations show a residual reddish or yellow clay and fragments of soft sandstone. The clay contains scattered pellets and nodules of psilomelane, and the sandstone is impregnated with the same mineral. Many of the pits show ribs of limestone, presumably of Helderberg Group, dipping at steep angles both northwestward and southwestward but not forming a simple anticline. Figure 3 shows a generalized section of the structure. (Not reproduced; the authors question the presence of faults shown by Reeves; see Cross-Section C—C′ on Map II.)

"On a hill slightly higher than the saddle in which the manganese prospecting was done a ditch has been dug showing a dark-reddish deposit of hematite in sandy clay, presumably the weathered product of the Ridgeley Sandstone. No ore has been shipped from this locality, and it offers no greater prospect for commercial development than the Waggoner mine."

During the progress of the field work for this report several samples of manganese ore were collected and the chemical analyses of these samples will be published on a subsequent page. In 1936 a special trip was made to Coles Mountain to check the structure and the manganese prespects described by Reeves. This trip resulted in the corrections parenthetically inserted in the quotation given above.

TABLE OF MANGANESE ORE ANALYSES.

The analyses shown in the following table were all made in the Survey laboratory of Mr. Homer A. Hoskins. The description and location of the samples follow the table:

Table of Manganese Ore Analyses.

Sample No.	Name of Prospect or Location.	Silica (SiO_2)	Ferric Iron (Fe_2O_3)	Alumina (Al_2O_3)	Manganese (MnO_2)	Lime (CaO)	Magnesia (MgO)	Alkalies (Na_2O, K_2O)	Titanium (TiO_2)	Phosphoric Acid (P_2O_5)	Moisture	Loss on Ignition	Nickel	Barium Oxide (BaO)	Sulphur	Total
117-PH	B aver Lick Mountain..	4.20	4.75	3.37	74.19	Trace	....	....	....	....	1.71	7.60	....	....	0.05	....
123-PH	Beaver Lick Mountain, West Side..........	2.62	0.90	23.11	52.84	None	0.66	....	Trace	0.69	0.17	18.00	1.04	0.76	....	99.26
126-PH	½ mi. W. of Alvon......	16.79	1.74	2.86	62.45	2.54	0.68	Trace	Trace	....	1.45	7.75	....	....	0.29	99.26
128-PH	½ mi. W. of Alvon......	20.60	2.45	4.22	55.08	2.78	2.78	....	0.02	0.60	1.33	7.39	....	2.75	....	100.00

117-PH Loose piece of manganese ore "float", picked up on the west side of Beaver Lick Mountain 0.2 mile north of the Greenbrier County line and 0.9 mile southeast of Burr.

123-PH Manganese ore from west side of Beaver Lick Mountain by Mr. Norman P. Fewell of Sue P. O.

126-PH Manganese ore from Mary Holyman Prospect on the north end of Coles Mountain. Collected by Norman P. Fewell.

128-PH Manganese ore from the dump of the Mary Holyman Prospect on the north end of Coles Mountain. Collected by Price and Nolting.

PRECIOUS METALS.

It was said long ago that an investigator who makes an adverse report upon a given region should be prepared to be as ill received as a physician who informs a patient that there is no hope of recovery.

A thorough investigation, however, of the stratigraphy and structure of the rocks of Greenbrier County leads the experienced geologist or engineer to the conclusion that the precious metals like gold, silver, copper, and lead will not be found save in small quantities, if at all. There exists, however, in practically every county of the State a belief that there is an abundance of these minerals hidden in some secure place, the exact location of which was known only by a man who is now gone, the report having been handed down from generation to generation. Credence in such beliefs is more prevalent in the more mountainous sections, the argument being offered that lands which do not contain coal and which are too rough for cultivation must have gold or other precious metals to preserve the general balance in nature.

It is a safe assumption, however, that the surface rocks of Greenbrier County, which are sedimentary, that is, deposited in or by water, will not contain precious metals in appreciable quantities. No trace of igneous intrusions, with which these metals are commonly associated, are known to occur in this area; neither are plugs or dikes known to occur, while almost the only quartz is that which is contained in the pebbles of the conglomeratic sandstones which were derived from the erosion of an ancient mountain mass located along what is now the Atlantic Coast. It is quite possible these ancient mountains, from which these sediments were derived, contained appreciable amounts of the precious metals, but in the process of erosion, transportation, and redeposition the ores have been so scattered that the present rocks contain only traces of their former localized accumulations.

PART IV.

Paleontology.

CHAPTER XIV.

NOTES ON PALEONTOLOGY, GREENBRIER COUNTY.

By John L. Tilton and Dana Wells.

The fossils listed on the following pages were collected by Dr. Paul H. Price, and others, during the field seasons of 1929, 1930, and 1931. A few collections were made at a later date to clear up points of controversy. The fossils listed are not intended to be a complete fossil index of Greenbrier County, but they were collected to show where collections might be made and to aid in stratigraphic correlation.

The identification of the collections was started by the late Professor John L. Tilton and the work was later completed by Professor Dana Wells. During the interim between the death of Dr. Tilton and the resumption of the identification by Mr. Wells, some of the collections were lost. However, the locations of these collections were preserved and are shown on Map II of this report.

The data with reference to the different collections are as follows:

Fossil Collections from Greenbrier County, W. Va.
(Register of Localities by Collection Nos.)

1. Helderberg Series; Becraft Limestone member; marine fossils; location, White Sulphur Dist., at the southwest end of Bobs Ridge two miles northeast of White Sulphur Springs; elevation, 1915′ B.; collector, P. H. Price; paleontologists, Tilton and Wells; see pages 731-2.

2. Mauch Chunk Series; Hinton Group; Avis Limestone member; marine fossils; location, Meadow Bluff Dist., 0.2 mi. S. E. of where Midland Trail crosses Little Clear Creek, or 0.8 mi. N. W. of Crawley P. O.; (same location as Coll. No. 82); elevation, 2465′ B.; collector, P. H. Price, paleontologist, Wells; see pages 695-6.

3. Pocono Series; Broad Ford Sandstone member; marine fossils; location, White Sulphur Dist., along C. & O. R. R. cut 0.7 mi. S. E. of Caldwell; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 202; collector, P. H. Price; paleontologists, Tilton and Wells; see page 715.

4. Chemung Series; marine fossils; location, White Sulphur Dist., along Midland Trail, 1.1 miles S. E. of Caldwell; elevation, 1750′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 717.

5. Pocono Series; Broad Ford Sandstone member; marine fossils; location, Williamsburg Dist., along Midland Trail, on east side of Brushy Ridge; elevation, 2275′ B.; collector, P. H. Price; paleontologists, Tilton and Wells; see page 716.

6. Pottsville Series; New River Group; Hartridge Shale member; marine (?) fossils; location, Meadow Bluff Dist., shale over Sewell Coal on Pollock Mountain, 0.6 mi. N. of Pollock Knob, Leckie Coal Co. Mine; elevation, 3525′ L.; collector, P. H. Price; collection lost.

7. Mauch Chunk Series; Bluefield Group; Lillydale Shale member; marine fossils; location, Fort Springs Dist., along road on E. side of Muddy Creek Mountain, 0.6 mi. S. E. of Kramer School; elevation, 2300′ B.; collector, P. H. Price; paleontologist, Wells; see page 700.

8. Greenbrier Series; Alderson Limestone member; marine fossils; location, Blue Sulphur Dist., along Mill Creek road 2.9 miles S. W. of Asbury (same location as Coll. No. 106); elevation, 1725′ B.; collector, P. H. Price; paleontologist, Wells; see page 701.

9. Marcellus Series; marine fossils; location, White Sulphur Dist., along improved road 0.8 mi. N. of junction of Dry Creek and Howard Creek at White Sulphur Springs; elevation, 1975′ B.; collector, P. H. Price; paleontologists, Tilton and Wells; see page 730.

10. Greenbrier Series; Alderson Limestone member; marine fossils; location, Lewisburg Dist., at Map El. 2377, 1.8 miles N. W. of Maxwelton; elevation, 2380′ B.; collector, P. H. Price; paleontologist, Wells; see page 702.

11. Mauch Chunk Series; Bluefield Group; marine fossils; location, Frankford-Lewisburg Dist. line, 1.8 miles N. W. of Maxwelton and 135′ above Coll. No. 10; elevation, 2515′ B.; collector, P. H. Price; paleontologist, Wells; see page 697.

12. Portage Series; marine fossils; location, White Sulphur Dist., along C. & O. R. R. 0.2 mi. E. of Harts Run; elevation, 1850′ B.; stratigraphy, Caldwell Section, p. 204; same location as Coll. No. 48; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 725.

13. Pottsville Series; New River Group; Sewell Coal roof shales; plant fossils; location, Meadow Bluff Dist., coal mine 0.8 mi. S. of McClung P. O.; elevation, 3100′ B.; collectors, P. H. Price and B. M. Higginbotham; collection lost.

14. Genesee Series; marine fossils; location, Anthony Creek Dist., along county road 0.3 mi. N. of Wileys Crossing; elevation, 1980′ B.; collector, P. H. Price; paleontologist, Tilton; see pages 728-9.

15. Pocono Series; Broad Ford Sandstone member; marine fossils; location, Frankford Dist., along county road 0.5 mi. N. W. of Anthony (same location as Coll. No. 97); elevation, 1965′ B.; collector, P. H. Price; paleontologists, Tilton and Wells; see page 716.

16. Portage Series; top; marine fossils (trails); location, Anthony Creek Dist., on east side of Slabcamp Mountain 1.5 miles N. of Sue; elevation, 2125′ B.; collector, P. H. Price, paleontologist, Tilton; see pages 725-6.

17. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, Lewisburg Dist., on Midland Trail at Wagner Hill 0.1 mi. E. of corporate limits of Lewisburg (same location as Coll. No. 27); elevation, 2260′ B.; collector, P. H. Price; paleontologist, Tilton; see page 707.

18. Chemung Series; near base; marine fossils; location, White Sulphur Dist., county road along Harts Run, 1.4 miles S. of Harts Run School, at bridge across Harts Run; elevation, 1950′ B.; collector, P. H. Price; paleontologist, Tilton; see page 718.

19. Greenbrier Series; Alderson Limestone member; marine fossils; location, Fort Springs Dist., on east side of Muddy Creek Mountain, 0.7 mi. S. E. of Hawver School; elevation, 1940′ B.; stratigraphy, Hawver School—East Section, p. 199; collector, P. H. Price; paleontologist, Wells; see page 702.

20. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, White Sulphur Dist., along C. & O. R. R. cut south of Caldwell and 0.1 mi. E. of Monroe Draft (same location as Colls. Nos. 21 and 136); elevation, 1760′ B.; stratigraphy, Caldwell Section, p. 202; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 708.

21. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, White Sulphur Dist., same location as Coll. No. 20, but a few feet lower; elevation, 1750′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 708-9.

22. Pocono Series; Broad Ford Sandstone member and shales directly above; plant fossils; location, White Sulphur Dist., along C. & O. R. R. cut 0.1 mi. W. of Caldwell Station; elevation, 1790′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 717.

23. Pocono Series; Broad Ford Sandstone member; marine fossils; location, White Sulphur Dist., same location as Coll. No. 3; elevation, 1790′ B.; stratigraphy, Caldwell Section, p. 202; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see pages 715-16.

24. Chemung Series; plant fossils; location, White Sulphur Dist., along C. & O. R. R. cut 0.7 mi. S. E. of Caldwell Station; elevation, 1795′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 718.

25. Chemung Series; near top; marine fossils; location, White Sulphur Dist., along C. & O. R. R. cut 0.9 mi. S. E. of Caldwell Station; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; collection lost.

26. Chemung Series; 50 feet lower than Coll. No. 25; marine fossils; location, White Sulphur Dist., along C. & O. R. R. cut 1 mile S. E. of Caldwell Station; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 718.

27. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, Lewisburg Dist., same location as Coll. No. 17; elevation, 2260′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 707-8.

28. Pocono Series; Broad Ford Sandstone member; plant fossils; location, White Sulphur Dist., along Midland Trail 0.7 mi. S. E. Caldwell P. O.; elevation, 1730′ B.; stratigraphy, Caldwell Section, p. 202; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 717.

29. Pocono Series; 50 feet lower than Coll. No. 28; marine fossils; location, White Sulphur Dist., along Midland Trail 0.8 mi. S. E. of Caldwell P. O.; elevation, 1760′ B.; stratigraphy, Caldwell Section, p. 202; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 714.

30. See Coll. No. 4, page 717.

31. Pocono Series; marine fossils; location, White Sulphur Dist., along Midland Trail north of road 0.9 mi. S. E. of Caldwell P. O.; elevation, 1770′ B.; stratigraphy, Caldwell Section, p. 202; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 715.

32. Chemung Series; 25 feet lower than Coll. No. 26; marine fossils; location, White Sulphur Dist., along C. & O. R. R. 1.3 miles S. E. of Caldwell P. O.; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 719.

33. Chemung Series; 10 feet lower than Coll. No. 32; marine fossils; location, White Sulphur Dist., along C. & O. R. R. 1.3 miles S. E. of Caldwell P. O.; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 719.

34. Chemung Series; 10 feet lower than Coll. No. 33; marine fossils; location, White Sulphur Dist., along C. & O. R. R. 1.3 miles S. E. of Caldwell P. O.; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 719.

35. Chemung Series; 80 feet lower than Coll. No. 34; marine fossils; location, White Sulphur Dist., along C. & O. R. R. 1.4 miles S. E. of Caldwell P. O.; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 719-20.

36. Chemung Series; marine fossils; location, White Sulphur Dist., along C. & O. R. R. 1.45 miles S. E. of Caldwell P. O.; elevation, 1805′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 720.

37. Chemung Series; marine fossils; location, White Sulphur Dist., along Midland Trail 1.5 miles S. E. of Caldwell P. O. and 0.1 mi. N. of "The Pines"; elevation, 1850′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 720-1.

38. Chemung Series; marine fossils; location, White Sulphur Dist., C. & O. R. R. cut just west of Harts Run P. O. (same location as Coll. No. 39); elevation, 1800′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 721.

39. Chemung Series; marine fossils; location, same as Coll. No. 38; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 721-2.

40. Chemung Series; marine fossils; location, same as Coll. No. 38; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 722-3.

41. Chemung Series; marine fossils; location, same as Coll. No. 38; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 723.

42. Chemung Series; marine fossils; location, same as Coll. No. 38; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 723.

43. Chemung Series; marine fossils; location, same as Coll. No. 38; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 203; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 723-4.

44. Chemung Series; marine fossils; location, same as Coll. No. 38; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 204; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 721.

45. Portage Series; plant fossils; location, White Sulphur Dist., along second-class road 0.05 mi. E. of Harts Run P. O.; elevation, 1800′ B.; stratigraphy, Caldwell Section, p. 204; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 726.

46. Portage Series; marine fossils; location, White Sulphur Dist., along Harts Run just south of C. & O. R. R. fill; elevation, 1775′ B.; stratigraphy, Caldwell Section, p. 204; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 726.

47. Portage Series; 10 feet higher than Coll. No. 46; trails; location, White Sulphur Dist., along Harts Run just south of C. & O. R. R. fill; elevation, 1785′ B.; stratigraphy, Caldwell Section, p. 204; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 726-7.

48. Portage Series; 10 feet higher than Coll. No. 46; marine fossils; location, White Sulphur Dist., along C. & O. R. R. 0.2 mi. E. of Harts Run; elevation, 1850′ B.; stratigraphy, Caldwell Section, p. 204; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 725.

49. Helderberg Series; Becraft Limestone member; marine fossils; location, White Sulphur Dist., on east side of Bobs Ridge 2 miles N. E. of White Sulphur Springs; elevation, 1920′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 732.

50. Helderberg Series; Becraft Limestone member; marine fossils; location, White Sulphur Dist., same location as Coll. No. 1; elevation, 1920′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 732.

51. Hamilton Series; marine fossils; White Sulphur Dist., along Jericho Draft road 2 miles N. of White Sulphur Springs; elevation, 1990′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see pages 729-30.

52. Portage Series; marine fossils; location, White Sulphur Dist., on Midland Trail, just west of Virginia-West Virginia boundary; elevation, 2400′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 727.

53. Chemung Series; marine fossils; location, White Sulphur Dist., on Midland Trail 0.7 mi. W. of Virginia-West Virginia boundary; elevation, 2215′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 724.

54. Marcellus Series; marine fossils; location, White Sulphur Dist., 1.1 miles N. E. of junction of Dry Creek and Howard Creek at White Sulphur Springs; elevation, 1880′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 730.

55. Hamilton Series; marine fossils; location, White Sulphur Dist., on Midland Trail 0.1 mi. S. of Greenbrier Hotel at White Sulphur Springs; elevation, 1975′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 730.

56. Silurian System, Niagara Series; marine fossils; location, Anthony Creek Dist., 200 feet west of the Keefer arch, 0.5 mi. W. of Alvon P. O.; elevation, 1950′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 734.

57. Genesee Series; marine fossils; location, Anthony Creek Dist., same location as Coll. No. 14; elevation, 1980′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 729.

58. Portage Series; marine fossils; location, Anthony Creek Dist., along Howard Creek road 1 mi. N. E. of Wild Meadow School; elevation, 2055′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see pages 727-8.

59. Portage Series; marine fossils; location, Anthony Creek Dist., 0.4 mi. N. E. of Wild Meadow School; elevation, 2200′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 728.

60. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, Lewisburg Dist., along Midland Trail at western corporate limits of Lewisburg; elevation, 2125′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 709.

61. Greenbrier Series; Sinks Grove Limestone member; marine fossils; location, Lewisburg Dist., along Midland Trail 0.75 mi. W. of corporate limits of Lewisburg; elevation, 2190′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 707.

62. Greenbrier Series; Patton Limestone member; plant and marine fossils; location, Lewisburg Dist., along Midland Trail, 1.5 miles W. of corporate limits of Lewisburg; elevation, 2100′ B.; collectors, P. H. Price, Tilton, and Nolting; collection lost.

63. Greenbrier Series; basal Patton Limestone; marine fossils; location, Lewisburg Dist., along Midland Trail 0.4 mi. W. of road fork to Hinton; elevation, 2100′ B.; collectors, P. H. Price, Tilton, and Nolting; collection lost.

64. Greenbrier Series; Union Limestone member; marine fossils; location, Lewisburg Dist., along Midland Trail 0.3 mi. N. W. of Richlands P. O.; elevation, 1990′ B.; stratigraphy, Richlands-Northwest Section, p. 199; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 705.

65. Greenbrier Series; Greenville Shale member; marine fossils; location, Lewisburg Dist., along Midland Trail 1.4 miles N. W. of Richlands P. O.; elevation, 2050′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 705.

66. Greenbrier Series; Alderson Limestone member; marine fossils; location, Lewisburg Dist., along Midland Trail 1.4 miles N. W. of Richlands P. O.; elevation, 2100′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 702.

67. Pocono Series; Broad Ford Sandstone member; marine fossils; location, Williamsburg Dist., same location, as Coll. No. 5; elevation, 2275′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologists, Tilton and Wells; see page 716.

68. Mauch Chunk Series; Bluefield Group; Reynolds Limestone member; marine fossils; location, Williamsburg Dist., along Midland Trail 1.4 miles N. W. of Alta P. O.; elevation, 2240′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 698.

69. Mauch Chunk Series; Bluefield Group; Reynolds Limestone member, immediately above Coll. No. 68; marine fossils; location, Williamsburg Dist., along Midland Trail 1.4 miles N. W. of Alta P. O.; elevation, 2245′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 698.

70. Mauch Chunk Series; Bluefield Group; Lillydale Shale member; plant fossils; location, Williamsburg Dist., along Midland Trail 1.3 miles N. W. of Alta P. O. (same location as Coll. No. 72); elevation, 2250′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; collection lost.

71. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, Williamsburg Dist., along Midland Trail 0.9 mi. N. W. of Alta P. O.; elevation, 2120′ B.; stratigraphy, Alta Section, p. 182; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 709.

72. Mauch Chunk Series; Bluefield Group; Lillydale Shale member; marine fossils; location, Williamsburg Dist., along Midland Trail 1.3 miles N. W. of Alta P. O. (same location as Coll. No. 70); elevation, 2250′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 700.

73. Mauch Chunk Series; Bluefield Group; Glenray Limestone member; marine fossils; location, Williamsburg Dist., along Midland Trail 1.3 miles N. W. of Alta P. O.; elevation, 2300′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 699.

74. Greenbrier Series; Pickaway Limestone member; marine fossils; location, Williamsburg Dist., along Midland Trail 1.0 mile N. W. of Alta P. O.; elevation, 2145′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; collection lost.

75. Greenbrier Series; Taggard Limestone member; marine fossils; location, Williamsburg Dist., along Midland Trail 1.0 mile N. W. of Alta P. O.; elevation, 2150′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 706.

76. Greenbrier Series; Union Limestone member (lower half); marine fossils; location, Williamsburg Dist.; along Midland Trail 1.1 miles N. W. of Alta P. O.; elevation, 2190′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton and Nolting; paleontologist, Wells; see page 706.

77. Greenbrier Series; Union Limestone member (upper half); marine fossils; location, Williamsburg Dist., along Midland Trail 1.1 miles N. W. of Alta P. O.; elevation, 2200′ B.; collectors, P. H. Price, Tilton, and Nolting; stratigraphy, Alta Section, p. 181; paleontologist, Wells; see page 706.

78. Greenbrier Series; Greenville Shale member; marine fossils; location, Williamsburg Dist., along Midland Trail 1.2 miles N. W. of Alta P. O.; elevation, 2230′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 705.

79. Greenbrier Series; Alderson Limestone member, marine fossils; location Williamsburg Dist., along Midland Trail 1.2 miles N. W. of Alta P. O.; elevation, 2240′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 703.

80. Greenbrier Series; Alderson Limestone member (top); marine fossils; location, Williamsburg Dist., along Midland Trail 1.2 miles N. W. of Alta P. O.; elevation, 2250′ B.; stratigraphy, Alta Section, p. 181; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 703.

81. Mauch Chunk Series; Bluefield Group (225 ft. below Stony Gap Sandstone); marine fossils; location, Williamsburg Dist., along Midland Trail, 0.4 mi. S. E. of Clintonville; elevation, 2350′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 697.

82. Mauch Chunk Series; Hinton Group; Avis Limestone member (top); marine fossils; location, Meadow Bluff Dist., along Midland Trail, 0.2 mi. S. E. of where Midland Trail crosses Little Clear Creek or 0.8 mi. N. W. of Crawley P. O., (same location as Coll. No. 2); elevation, 2465′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 696.

83. Mauch Chunk Series; Hinton Group; Avis Limestone member (top); marine fossils; location, Meadow Bluff Dist., along Midland Trail 1.4 mi. N. W. of Crawley P. O.; elevation, 2475′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 696.

84. Pottsville Series; Pocahontas Group; roof shales, No. 3 Pocahontas Coal; plant fossils; location, Meadow Bluff Dist., coal blossom on N. W. end of Little Sewell Mountain 1.1 mi. N. E. of Rainelle; elevation, 2700′ B.; collectors, P. H. Price, Tilton, and Nolting; collection lost.

85. Pottsville Series; New River Group; Sewell Coal member; plant fossils; location, Meadow Bluff Dist.; coal bank 0.1 mi. S. W. of Orient Hill Church or 0.8 mi. S. of McClung P. O. (same location as Coll. No. 13); elevation, 3100′ B.; collectors, P. H. Price, Tilton, and Nolting; collection lost.

86. Pleistocene (?); algae (?); location, Meadow Bluff Dist., along Midland Trail just W. of Rupert; elevation, 2430′ B.; collectors, P. H. Price, Tilton, and Nolting; collection lost.

87. Mauch Chunk Series; Ada (?) Shale; marine fossils; location, Falling Springs Dist., along Seneca Trail, 1.7 mi. N. of Renick P. O.; elevation, 2550′ B.; stratigraphy, Renick Station Section, p. 188; collectors, P. H. Price, Tilton, and Nolting; collection lost.

88. Mauch Chunk Series; Bluefield Group; Reynolds Limestone member; marine fossils; location, Falling Springs Dist., along Seneca Trail 1.5 mi. N. of Renick P. O; elevation, 2540′ B.; stratigraphy, Renick Station Section, p. 188; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 698.

89. Mauch Chunk Series; Bluefield Group; Glenray Limestone member; plant and marine fossils; location, Falling Springs Dist., along Seneca Trail 1.4 mi. N. of Renick P. O.; elevation, 2500′ B.; stratigraphy, Renick Station Section, p. 188; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 699.

90. Greenbrier Series; Alderson Limestone member (top); marine fossils; location, Falling Springs Dist., along Seneca Trail 1.2 mi. N. of Renick P. O.; elevation, 2375′ B.; stratigraphy, Renick Station Section, page 189; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 703.

91. Mauch Chunk Series; Bluefield Group; Lillydale Shale member (top); marine fossils; location, Falling Springs Dist., along Seneca Trail 1.25 mi. N. of Renick P. O.; elevation, 2400′ B.; stratigraphy, Renick Station Section, p. 189; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 700.

92. Greenbrier Series; Alderson Limestone member; marine fossils; location, Falling Springs Dist., along Seneca Trail 1.05 mi. N. of Renick P. O.; elevation, 2300′ B.; stratigraphy, Renick Station Section, p. 189; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells, see page 703.

93. Mauch Chunk Series; Bluefield Group, marine fossils; location, Falling Springs Dist., along Seneca Trail 0.9 mi. N. of Renicks Valley P. O. or just S. of Pocahontas County line; elevation, 2970′ B.; collectors, Tilton, and Nolting; paleontologist, Wells; see page 697.

94. Mauch Chunk Series; Bluefield Group; Lillydale Shale member; marine fossils; location, Falling Springs Dist., along Seneca Trail 0.65 mi. N. of Renicks Valley P. O. or just S. of Pocahontas County line; elevation, 2710′ B.; collectors, Tilton and Nolting; paleontologist, Wells; see page 701.

95. Mauch Chunk Series; Bluefield Group; Reynolds Limestone member; location, Falling Springs Dist., 0.7 mi. N. of Renicks Valley P. O. or just S. of Pocahontas County line; collectors, Tilton and Nolting; paleontologist, Wells; see pages 698-9.

96. Mauch Chunk Series; Hinton Group; Avis Limestone member; marine fossils; location, Williamsburg Dist., along road over Cold Knob Mountain, 2.2 mi. N. W. of Trout Valley P. O.; elevation, 3400′ B.; collectors, Tilton and Nolting; paleontologist, Wells; see pages 696-7.

97. Pocono Series; Broad Ford Sandstone member; marine fossils; location, Frankford Dist., along county road 0.5 mi. N. W. of Anthony (same location as Coll. No. 15); elevation, 1965′ B.; collectors, Tilton and Nolting; paleontologists, Tilton and Wells; see pages 716-17.

98. Greenbrier Series; Hillsdale Limestone member, just below chert; marine fossils; location, Irish Corner Dist., along county road 1.4 mi. W. of Altavista School; elevation, 2160′ B.; collectors, Tilton and Nolting; paleontologist, Tilton; see pages 709-10.

99. Greenbrier Series; Hillsdale Limestone member (just above Coll. 98); location, Irish Corner Dist., along county road 1.4 miles W. of Altavista School; elevation, 2165′ B.; collectors, Tilton and Nolting; paleontologist, Tilton; see page 710.

100. Greenbrier Series; Hillsdale (upper) Limestone member; location, Irish Corner Dist., along county road 1.35 mi. W. of Altavista School; elevation, 2200′ B.; collectors, Tilton and Nolting, paleontologist, Tilton; see pages 710-11.

101. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, Irish Corner Dist., along county road 1.3 mi. W. of Altavista School; collectors, Tilton and Nolting; paleontologist, Tilton; see page 711.

102. Greenbrier Series; Alderson (?) Limestone member; marine fossils; location, Fort Springs Dist., on E. side of S. end of Muddy Creek Mountain 0.7 mi. S. E. of Hawver School (same location as Coll. No. 19); elevation, 1940′ B.; stratigraphy, Hawver School—East Section, p. 199; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 702.

103. Greenbrier Series; Taggard Limestone member; marine fossils; location Fort Springs Dist., 1 mi. N. of Fort Spring; elevation, 1800′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 706.

104. Mauch Chunk Series; Bluefield Group; Glenray Limestone member; marine fossils; location, Fort Springs Dist., 0.3 mile E. of Hawver School; elevation 2140′ B.; stratigraphy, Hawver School—East Section, p. 199; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 699.

105. Mauch Chunk Series; Bluefield Group; Glenray Limestone member; marine fossils; location, Fort Springs Dist., 0.3 mi. W. of Hawver School; elevation, 2355′ B.; stratigraphy, Hawver School—East Section, p. 199; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 700.

106. Greenbrier Series; Alderson (?) Limestone member; marine fossils; location, Blue Sulphur Dist., along Mill Creek road 2.9 miles S. W. of Asbury (same location as Coll. No. 8); elevation, 1725′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Wells; see page 701.

107. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, Blue Sulphur Dist., in road at church 0.2 mi. S. of Asbury; elevation, 2115′ B.; collectors, P. H. Price, Tilton, and Nolting; paleontologist, Tilton; see page 711.

108. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, Irish Corner Dist., in new road cut on Seneca Trail 0.6 mi. N. W. of Organ Cave P. O.; elevation, 2215′ B.; collectors, P. H. Price, Tilton, Nolting, and M. T. Sydenstrycker; paleontologist, Tilton; see pages 711-13.

109. Greenbrier Series; Alderson Limestone (base); plant fossils; location, Frankford Dist., on road from Maxwelton to Williamsburg 0.8 mi N. E. of Brantville P. O.; elevation, 2190′ B.; stratigraphy, Savannah School Section, p. 200; collector, P. H. Price; collection sent to David White.

110. Greenbrier Series; Alderson Limestone member; marine fossils; location, Falling Springs Dist., along road 0.45 mi. N. E. of Rapp School or 1.7 mi. S. W. of Falling Springs (Renick); elevation, 2120′ B.; stratigraphy, Butler Mountain Section, p. 185; collector, P. H. Price; paleontologist, Wells; see page 703.

111. Greenbrier Series; Alderson Limestone member; marine fossils; location Falling Springs Dist., along road 0.45 mi. N. E. of Rapp School or 1.65 mi. S. W. of Falling Springs (Renick); elevation, 2120′B.; stratigraphy, Butler Mountain Section, p. 185; collector, P. H. Price; paleontologist, Wells; see page 704.

112. Greenbrier Series; Alderson Limestone member; marine fossils; location Falling Springs Dist., on road 0.45 mi. N. E. of Rapp School or 1.7 mi. S. W. of Falling Springs (Renick); stratigraphy, Butler Mountain Section, p. 185; collector, P. H. Price; paleontologist, Wells; see page 704.

113. Greenbrier Series; Alderson Limestone member; marine fossils; location, Falling Springs Dist., on road 0.4 mi. N. E. of Rapp School or 1.7 mi. S. W. of Falling Springs (Renick): stratigraphy, Butler Mountain Section, p. 185; collector, P. H. Price; paleontologist, Wells; see page 704.

114. Mauch Chunk Series; Bluefield Group; Reynolds Limestone member; marine fossils; location, Fort Springs Dist., along road 0.5 mi. W. of Hawver School; elevation, 2525′ B.; stratigraphy, Hawver School—West Section, p. 198; collector, P. H. Price; paleontologist, Wells; see page 699.

115. Helderberg Series; Becraft Limestone member; marine fossils; location Anthony Creek Dist., 0.3 mi. S. E. of Alvon; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 732.

116. Chemung Series; marine fossils; location, Anthony Creek Dist., on Twomile Run 2.1 mi. N. of Neola; elevation, 2150′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 724.

117. Collection lost and location uncertain.

118. Niagara Series; marine fossils; location, Anthony Creek Dist., 0.3 mi. W. of Alvon; elevation, 2050′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 734.

119. Niagara (?) Series; marine fossils; location, Anthony Creek Dist., 0.1 mi. W. of Alvon; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 734.

120. Bossardville Series; marine fossils; location, Anthony Creek Dist., 0.1 mi. S. of Alvon; collectors, P. H. Price and Nolting; paleontologist, Wells; see pages 733-4.

121. Helderberg Series; Becraft Limestone member; marine fossils; location, White Sulphur Dist., on E. side of Bobs Ridge 2 mi. N. E. of White Sulphur Springs (same location as Coll. No. 49); collectors, P. H. Price and Nolting; paleontologist, Wells; see page 732.

122. Helderburg Series; New Scotland member; marine fossils; location, White Sulphur Dist., on E. side of Bobs Ridge 1.35 mi. N. E. of White Sulphur Springs; collectors, P. H. Price and Nolting; paleon tologist, Wells; see page 733.

123. Helderberg Series; Becraft Limestone member; marine fossils; location White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; elevation, 2040′ B.; stratigraphy, Eckle School Section, p. 204; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 733.

124. Helderberg Series; Becraft Limestone member, marine fossils; location, White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; elevation, 1960′ B.; stratigraphy, Eckle School Section, p. 204; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 733.

125. Oriskany Series; Huntersville Chert member; marine fossils; location, White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; stratigraphy, Eckle School Section, p. 204; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 731.

126. Genesee (?) Series; marine fossils; location, Anthony Creek Dist., 0.7 mi. N. of Bound School or 2.4 miles N. E. of Alvon; elevation, 2015′ B.; collectors, P. H. Price and Nolting; collection lost.

127. Clinton Series; marine fossils; location, Anthony Creek Dist., on Beaver Lick Mountain 1.3 miles E. of Upper Little Creek School; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 734.

128. Oriskany Series; Huntersville Chert member; marine fossils; location, White Sulphur Dist., on E. side of Bobs Ridge 1 mile S. W. of Wild Meadow School; elevation, 2079′ L.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 731.

129. Chemung Series; marine fossils; location, White Sulphur Dist., on Slash Lick Run 1.1 mi. S. of Wild Meadow School; elevation, 2125′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 725.

130. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, Blue Sulphur Dist., 1 mi. S. of Asbury; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 713.

131. Pottsville Series; New River Group; plant fossils; location, Williamsburg Dist., on E. side of Buffalo Mountain 2.1 mi. N. W. of Cornstalk; elevation, 3875′ B.; collectors, P. H. Price and Nolting; collection lost.

132. Mauch Chunk Series; Hinton Group; Avis Limestone member; marine fossils; location, Williamsburg Dist., 1 mi. N. W. of Liberty School; elevation, 2830′ B.; stratigraphy, Roach Run Section, p. 179; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 697.

133. Pottsville Series; plant fossils; location, Meadow Bluff Dist., on E. side of Point Mountain 4.8 mi. E. of Anjean; elevation, 3537′ L.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 694.

134. Greenbrier Series; Alderson Limestone member; marine fossils; location, Blue Sulphur Dist., just E. of Spotts Ridge along road 2 mi. W. of Piercys Mill; elevation, 1790′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see pages 704-5.

135. Marcellus Series; marine fossils; White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; elevation, 1965′ B.; stratigraphy, Eckle School Section, p. 204; collectors, P. H. Price, Bevan, Woodward, Smith, and Nolting; paleontologist, Wells; see page 730.

136. Greenbrier Series; Hillsdale Limestone member; marine fossils; location, White Sulphur Dist., on Howard Creek just S. of Caldwell (same location as Coll. No. 20); elevation, 1750′ B.; collectors, P. H. Price, Bevan, and Woodward; paleontologist, Wells; see page 709.

137. Mauch Chunk Series; Hinton Group; Terry Limestone member; marine fossils; location, Meadow Bluff Dist., 0.4 mi. N. of Meadow Grove Church and 0.15 mi. W. of road intersection or 1.3 mi. S. of Vale (location omitted from Map II); elevation, 2600′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 695.

138. Greenbrier Series; Pickaway Limestone member; location, Irish Corner Dist., Acme Limestone Quarry 1 mi. W. of Fort Spring; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 706.

139. Pottsville Series; Pocahontas Group; Royal Shale member; marine ? fossils; location, Quinnimont Dist., Fayette County, near Fayette-Greenbrier County line 2.1 mi. E. of Springdale; elevation, 3070′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 694.

140. Pottsville Series; Pocahontas Group; Royal (?) Shale member; marine ? fossils; location, Meadow Bluff Dist., 2.2 mi. S. of Rupert or 0.7 mi. N. E. of Dennis; elevation, 3255′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 694.

141. Pottsville Series; Pocahontas Group; plant fossils; location, Meadow Bluff Dist., on W. side of Goddard Mountain 2 mi. S. E. of East Rainelle; elevation, 2950′ B.; collectors, P. H. Price and Nolting; collection lost.

142. Pottsville Series; New River Group; Sewell Coal member (roof shales); marine ? fossils; location, Meadow Bluff Dist., on Shellcamp Ridge 1.2 mi. S. of Duo; elevation, 3580′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 693.

143. Pottsville Series; New River Group; Sewell Coal member (roof shales); marine ? and plant fossils; location, Meadow Bluff Dist., near Duo; elevation, 3425′ L.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 693.

144. Pottsville Series; New River Group; Sewell Coal member (roof shales); marine ? fossils; location, Meadow Bluff Dist., 0.9 mi. E. of Bingham or 2.5 mi. W. of Bellburn; elevation, 2855′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 693.

145. Pottsville Series; New River Group; Sewell Coal member (roof shales); marine ? and plant fossils; location, Meadow Bluff Dist., 1.9 mi. W. of Bellburn; elevation, 2890′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells, see page 694.

146. Pottsville Series; New River Group; Sewell Coal member (roof shales); marine ? fossils; location, Meadow Bluff Dist., 1.1 mi. S. E. of Bingham or 2.5 mi. N. W. of Charmco; elevation, 2915′ B.; collectors, P. H. Price and Nolting; paleontologist, Wells; see page 694.

147. Mauch Chunk Series; Bluestone Group; marine fossils; location, Meadow Bluff Dist., along public road 0.8 mi. N. W. of Dennis; elevation, 2670′ B.; collectors; P. H. Price and Nolting; paleontologist, Wells; see page 695.

148. Mauch Chunk Series; Hinton Group; Terry (?) Limestone member; marine fossils; location, Falling Springs Dist., on South Fork of Cherry River between Mitchell and Becky Runs; elevation, 2915′ B.; collectors, P. H. Price and Furbee; paleontologist, Wells; see page 695.

149. Pottsville Series; New River Group; Sewell Coal member (roof shales); marine ? fossils; location, Falling Springs Dist., at North Bend Mine; collectors, P. H. Price and Furbee; paleontologist, Wells; see page 694.

150. Mauch Chunk Series; Bluestone Group; microfossils; location, Falling Springs Dist., near Cherry Low Place; elevation, 3450′ B.; collectors, P. H. Price and Heck; paleontologist, Wells; see page 695.

151. Helderberg Series; Becraft Limestone member; marine fossils; location, White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; stratigraphy, Eckle School Section, p. 204; collectors, P. H. Price and Heck; paleontologist, Wells; see page 733.

152. Oriskany Series; Ridgeley Sandstone member; marine fossils; location, White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; stratigraphy, Eckle School Section, p. 204; collectors, P. H. Price and Heck; paleontologist, Wells; see page 731.

Distribution of Collections by Geologic Formations.

Pennsylvanian System.
- Pottsville Series.
  - New River Group, Nos. 6, 13, 85, 131, 142, 143, 144, 145, 146, 149.
  - Pocahontas Group, Nos. 84, 133, 139, 140, 141.

Mississippian System.
- Mauch Chunk Series.
  - Bluestone Group, Nos. 147, 150.
  - Hinton Group.
    - Terry, Nos. 137, 148.
    - Avis, Nos. 2, 82, 83, 96, 132.
  - Bluefield Group, Nos. 11, 81, 93.
    - Ada, No. 87.
    - Reynolds, Nos. 68, 69, 88, 95, 114.
    - Glenray, Nos. 73, 89, 104, 105.
    - Lillydale, Nos. 7, 70, 72, 91. 94.
- Greenbrier Series.
    - Alderson, Nos. 8, 10, 19, 66, 79, 80, 90, 92, 102, 106, 109, 110, 111, 112, 113, 134.
    - Greenville, Nos. 65, 78.
    - Union, Nos. 64, 76, 77.
    - Pickaway, Nos. 74, 138.
    - Taggard, Nos. 75, 103.
    - Patton, Nos. 62, 63.
    - Sinks Grove, No. 61.
    - Hillsdale, Nos. 17, 20, 21, 27, 60, 71, 98, 99, 100, 101, 107, 108, 130, 136.
- Pocono Series, Nos. 29, 31.
    - Broad Ford, Nos. 3, 5, 15, 22, 23, 28, 67, 97.

Devonian System.

Upper Devonian.

Chemung Series, Nos. 4, 18, 24, 25, 26, 30, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 53, 116, 129.

Portage Series, Nos. 12, 16, 45, 46, 47, 48, 52, 58, 59.

Genesee Series, Nos. 14, 57, 126.

Middle Devonian.

Hamilton Series, Nos. 51, 55.

Marcellus Series, Nos. 9, 54, 135.

Lower Devonian.

Oriskany Series.

Huntersville, Nos. 125, 128.

Ridgeley, No. 152.

Helderberg Series.

Becraft, Nos. 1, 49, 50, 115, 121, 123, 124, 151.

New Scotland, No. 122.

Silurian System.

Salina Series.

Bossardville, No. 120.

Niagara Series, Nos. 56, 118, 119.

Clinton Series, No. 127.

PENNSYLVANIAN.

POTTSVILLE SERIES.

NEW RIVER GROUP.

No. 6.—Collection lost.

No. 13.—Collection lost.

No. 85.—Collection lost.

No. 131.—Collection lost.

No. 142.—Location: Meadow Bluff Dist., on Shellcamp Ridge 1.2 mi. S. of Duo; elevation, 3580′ B.

Fossils:

Fish Scales
Fish Teeth
Plant Remains

No. 143.—Location: Meadow Bluff Dist., near Duo; elevation, 3425′ L.

Fossils:

Naiadites elongata
Plant Remains

No. 144.—Location: Meadow Bluff Dist., 0.9 mi. E. of Bingham or 2.5 mi. W. of Bellburn; elevation, 2855′ B.

Fossils:

Naiadites elongata

No. 145.—Location: Meadow Bluff Dist., 1.9 mi. W. of Bellburn; elevation, 2890′ B.

Fossils:

Naiadites elongata
Plant Remains

No. 146.—Location: Meadow Bluff Dist., 1.1 mi. S. E. of Bingham or 2.5 mi. N. W. of Charmco; elevation, 2915′ B.

Fossils:

Fish Teeth
Fish Scales
Coprolites
Plant Remains

No. 149.—Location: Falling Springs Dist., at North Bend Mine.

Fossils:

Naiadites elongata

POCAHONTAS GROUP.

No. 84.—Collection lost.

No. 133.—Location: Meadow Bluff Dist., on E. side of Point Mountain 4.18 mi. E. of Anjean; elevation, 3537′ L.

Fossils:

Plant Fragments

No. 139.—Quinnimont Dist., Fayette County, near Fayette-Greenbrier County line 2.1 mi. E. of Springdale; elevation, 3070′ B.

Fossils:

Naiadites elongata

No. 140.—Location: Meadow Bluff Dist., 2.2 mi. S. of Rupert or 0.7 mi. N. E. of Dennis; elevation, 3255′ B.

Fossils:

Naiadites elongata

No. 141.—Collection lost.

MISSISSIPPIAN.

MAUCH CHUNK SERIES.

BLUESTONE GROUP.

No. 147.—Location: Meadow Bluff Dist., along public road 0.8 mi. N. W. of Dennis; elevation, 2670′ B.

Fossils:

Chonetes sp.
Spirifer Pellaensis
Spiriferina spinosa
Eumetria vera
Pleurotomaria sp.
Sphaerodoma sp.

No. 150.—Location: Falling Springs Dist., near Cherry Low Place; elevation, 3450′ B.

Fossils:

Ostracoda indet.

HINTON GROUP.

Terry Limestone.

No. 137.—Location: Meadow Bluff Dist., 0.4 mi. N. of Meadow Grove Church and 0.15 mi. W. of road intersection or 1.3 mi. S. of Vale (location omitted from Map II); elevation, 2600′ B.

Fossils:

Crinoid indet.
Orthotetes Kaskaskiensis
Diaphragmus elegans
Composita subquadrata
Eumetria vera

No. 148.—Location: Falling Springs Dist., on South Fork of Cherry River between Mitchell and Becky Runs; elevation, 2915′ B.

Fossils:

Lingula sp.
Productus sp.
Schizodus (?) sp.

Avis Limestone.

No. 2.—Location: Meadow Bluff Dist., 0.2 mi. S. E. of where Midland Trail crosses Little Clear Creek, or 0.8 mi.

N. W. of Crawley P. O. (same location as Coll. No. 82); elevation, 2465′ B.

Fossils:

Crinoid indet.
Fistulipora sp.
Stenopora sp.
Fenestella tenax
Fenestella sev. sp.
Polypora sp.
Orthotetes Kaskaskiensis
Diaphragmus elegans
Spiriferina spinosa
Composita subquadrata
Cliothyridina sublamellosa
Eumetria vera
Allerisma clavatum

No. 82. Location: Meadow Bluff Dist., along Midland Trail, 0.2 mi. S. E. of where Midland Trail crosses Little Clear Creek or 0.8 mi. N. W. of Crawley P. O., (same location as Coll. No. 2); elevation, 2465′ B.

Fossils:

Crinoid indet.
Fistulipora sp.
Fenestella sp.
Polypora sp.
Orthotetes Kaskaskiensis
Diaphragmus elegans
Spirifer Pellaensis
Spiriferina spinosa
Composita subquadrata
Eumetria vera
Allerisma clavatum

No. 83. Location: Meadow Bluff Dist., along Midland Trail 1.4 mi. N. W. of Crawley P. O.; elevation, 2475′ B.

Fossils:

Fistulipora sp.
Fenestella sp.
Diaphragmus elegans
Spiriferina spinosa
Composita subquadrata
Cliothyridina sublamellosa
Eumetria vera

No. 96. Location: Williamsburg Dist., along road over Cold Knob Mountain, 2.2 mi. N. W. of Trout Valley P. O.; elevation, 3400′ B.

Fossils:

Triplophyllum Pellense
Pentremites Godoni
Pentremites pyriformis
Crinoid indet.
Composita trinuclea
Cliothyridina sublamellosa

No. 132.—Location: Williamsburg Dist., 1 mile N. W. of Liberty School; elevation, 2830′ B.

Fossils:

Fistulipora sp.
Fenestella tenax
Fenestella sp.
Orthotetes Kaskaskiensis
Diaphragmus elegans
Composita subquadrata
Cliothyridina sublamellosa
Allerisma clavatum

BLUEFIELD GROUP.

No. 11.—Location: Frankford-Lewisburg Dist. line, 1.8 mi. N. W. of Maxwelton and 135 feet above Coll. No. 10; elevation, 2515′ B.

Fossils:

Crinoid indet.
Fenestella tenax
Fenestella sp.
Archimedes sp.
Diaphragmus elegans
Camarophoria explanata
Spiriferina spinosa
Aviculopecten Monroensis?

No. 81.—Location: Williamsburg Dist., along Midland Trail, 0.4 mi. S. E. of Clintonville; elevation, 2350′ B.

Fossils:

Myalina sp.

No. 93.—Location: Falling Springs Dist., along Seneca Trail 0.9 mi. N. of Renicks Valley P. O. or just S. of Pocahontas County line; elevation, 2970′ B.

Fossils:

Spirifer Pellaensis
Spiriferina spinosa?
Allerisma sp.
Aviculopecten (?) sp.

Ada Shale.

No. 87.—Collection lost.

Reynolds Limestone.

No. 68.—Location: Williamsburg Dist., along Midland Trail 1.4 miles N. W. of Alta P. O.; elevation, 2240′ B.

Fossils:

Crinoid indet.
Orthotetes Kaskaskiensis
Diaphragmus elegans
Spirifer Pellaensis
Composita trinuclea
Composita subquadrata

No. 69.—Location: Williamsburg Dist., along Midland Trail 1.4 miles N. W. of Alta P. O.; elevation, 2245′ B.

Fossils:

Archimedes sp.
Orthotetes Kaskaskiensis
Productus ovatus
Diaphragmus elegans
Spirifer Pellaensis?
Spiriferina spinosa
Composita trinuclea
Griffithides sp.

No. 88.—Location: Falling Springs Dist., along Seneca Trail 1.5 mi. N. of Renick P. O; elevation, 2540′ B.

Fossils:

Archimedes sp.
Orthotetes Kaskaskiensis
Spirifer Pellaensis
Composita subquadrata
Eumetria Verneuiliana
Allerisma sp.

No. 95—Location: Falling Springs Dist., 0.7 mi. N. of Renicks Valley P. O. or just S. of Pocahontas County line.

Fossils:

Pentremites sp.
Crinoid indet.
Fenestella tenax
Stenopora sp.
Orthotetes Kaskaskiensis

Productus inflatus
Diaphragmus elegans
Spirifer Pellaensis
Composita subquadrata
Cliothyridina sublamellosa
Griffithides sp.

No. 114.—Location: Fort Springs Dist., along road 0.5 mi. W. of Hawver School; elevation, 2525′ B.

Fossils:

Productus ovatus
Diaphragmus elegans
Spirifer Pellaensis
Composita subquadrata

Glenray Limestone.

No. 73.—Location: Williamsburg Dist., along Midland Trail 1.3 miles N. W. of Alta P. O.; elevation, 2300′ B.

Fossils:

Pentremites sp.
Crinoid indet.
Fenestella sp.
Spirifer Pellaensis
Spiriferina spinosa

No. 89.—Location: Falling Springs Dist., along Seneca Trail 1.4 mi. N. of Renick P. O.; elevation, 2500′ B.

Fossils:

Triplophyllum Pellense
Pentremites Godoni
Pentremites pyriformis
Pentremites sp.
Crinoid indet.
Fenestella tenax
Archimedes sp.
Diaphragmus elegans
Camarophoria explanata
Spirifer Pellaensis
Composita trinuclea?
Composita subquadrata
Cliothyridina sublamellosa

No. 104.—Location: Fort Springs Dist., 0.3 mile E. of Hawver School; elevation, 2140′ B.

Fossils:

Fenestella tenax
Orthotetes Kaskaskiensis
Diaphragmus elegans
Spirifer Pellaensis
Composita subquadrata
Griffithides sp.

No. 105.—Location: Fort Springs Dist., 0.3 mi. W. of Hawver School; elevation, 2355′ B.

Fossils:

Triplophyllum Pellense
Crinoid indet.
Archimedes sp.
Orthotetes Kaskaskiensis
Diaphragmus elegans
Spirifer Pellaensis
Griffithides sp.

Lillydale Shale.

No. 7.—Location: Fort Springs Dist., along road on E. side of Muddy Creek Mountain, 0.6 mi. S. E. of Kramer School; elevation, 2300′ B.

Fossils:

Fenestella sp.
Orthotetes Kaskaskiensis
Chonetes sericeus
Productus ovatus
Diaphragmus elegans
Spirifer Pellaensis
Composita subquadrata
Edmondia sp.
Nucula sp.
Schizodus depressus var. abruptus?
Aviculopecten Monroensis
Aviculopecten (?) sp.
Conocardium sp.

No. 70.—Collection lost. (Same location as Coll. No. 72).

No. 72.—Location: Williamsburg Dist., along Midland Trail 1.3 miles N. W. of Alta P. O.; elevation, 2250′ B.

Fossils:

Lingula (?) sp.
Pelecypoda indet.

No. 91.—Location: Falling Springs Dist., along Seneca Trail 1.25 mi. N. of Renick P. O.; elevation, 2400′ B.

Fossils:

Crinoid indet.
Spirifer Pellaensis
Spiriferina transversa
Eumetria Verneuiliana?
Leda sp.

No. 94.—Location: Falling Springs Dist., along Seneca Trail 0.65 mi. N. of Renicks Valley P. O. or just S. of Pocahontas County line; elevation, 2710′ B.

Fossils:

Fenestella sev. sp.
Archimedes sp.
Polypora sp.
Orthotetes Kaskaskiensis
Productus ovatus
Diaphragmus elegans
Spirifer Pellaensis
Spiriferina spinosa
Spiriferina transversa
Reticularia setigera
Composita subquadrata
Edmondia sp.
Griffithides sp.

GREENBRIER SERIES.

Alderson Limestone.

No. 8.—Location: Blue Sulphur Dist., along Mill Creek road 2.9 mi. S. W. of Asbury (same location as Coll. No. 106); elevation, 1725′ B.

Fossils:

Fistulipora sp.
Productus inflatus
Productus ovatus
Diaphragmus elegans
Spirifer Pellaensis
Composita subquadrata
Eumetria Verneuiliana

No. 106.—Location: Blue Sulphur Dist., along Mill Creek road 2.9 miles S. W. of Asbury (same location as Coll. No. 8); elevation, 1725′ B.

Fossils:

Crinoid indet.
Fenestella tenax?
Orthotetes Kaskaskiensis
Productus inflatus
Productus ovatus
Spiriferina spinosa
Composita subquadrata
Cliothyridina sublamellosa

No. 10.—Location: Falling Springs Dist., along road 0.45 mi. N. E. of Rapp School or 1.7 mi. S. W. of Falling Springs (Renick); elevation, 2120′ B.

Fossils:

Syringopora (?) sp.

No. 19.—Location: Fort Springs Dist., on east side of Muddy Creek Mountain, 0.7 mi. S. E. of Hawver School (same location as Coll. No. 102); elevation, 1940′ B.

Fossils:

Fistulipora sp.
Productus inflatus
Spirifer Pellaensis
Composita subquadrata

No. 102.—Location: Fort Springs Dist., on E. side of S. end of Muddy Creek Mountain 0.7 mi. S. E. of Hawver School (same location as Coll. No. 19); elevation, 1940′ B.

Fossils:

Triplophyllum Pellense
Crinoid indet.
Fistulipora sp.
Stenopora sp.
Fenestella sp.
Polypora sp.
Orthotetes Kaskaskiensis
Productus inflatus
Productus ovatus
Spirifer Pellaensis
Composita subquadrata
Cliothyridina sublamellosa
Eumetria Verneuiliana
Parallelodon (?) sp.
Griffithides sp.

No. 66.—Location: Lewisburg Dist., along Midland Trail 1.4 miles N. W. of Richlands P. O.; elevation, 2100′ B.

Fossils:

Crinoid indet.
Fistulipora sp.
Fenestella tenax
Fenestella sev. sp.
Polypora sp.
Orthotetes Kaskaskiensis
Productus inflatus
Spirifer Pellaensis
Composita subquadrata
Cliothyridina sublamellosa

No. 79.—Location: Williamsburg Dist., along Midland Trail 1.2 miles N. W. of Alta P. O.; elevation, 2240′ B.

Fossils:

Crinoid indet.
Fenestella tenax
Fenestella sev. sp.
Archimedes sp.
Chonetes sericeus?
Productus inflatus
Spirifer Pellaensis

No. 80.—Location: Williamsburg Dist., along Midland Trail 1.2 miles N. W. of Alta P. O.; elevation, 2250′ B.

Fossils:

Crinoid indet.
Fenestella sp.
Chonetes sericeus?
Spirifer Pellaensis
Composita subquadrata?

No. 90.—Location: Falling Springs Dist., along Seneca Trail 1.2 mi. N. of Renick P. O.; elevation, 2375′ B.

Fossils:

Triplophyllum Pellenese
Crinoid indet.
Fenestella sp.
Orthotetes Kaskaskiensis
Productus sp.
Composita subquadrata
Cliothyridina sublamellosa
Griffithides sp.

No. 92.—Location: Falling Springs Dist., along Seneca Trail 1.05 mi. N. of Renick P. O.; elevation, 2300′ B.

Fossils:

Fistulipora sp.
Stenopora sp.
Productus inflatus
Spirifer Pellaensis
Composita subquadrata

No. 109.—Collection sent to Mr. David White.

No. 110.—Location: Falling Springs Dist., along road 0.45 mi. N. E. of Rapp School or 1.7 mi. S. W. of Falling Springs (Renick); elevation, 2120′ B.

Fossils:

Fish Plate

No. 111.—Location: Falling Springs Dist., along road 0.45 mi. N. E. of Rapp School or 1.65 mi. S. W. of Falling Springs (Renick); elevation, 2120′ B.

Fossils:

Stenopora sp.
Rhombopora sp.
Crania aff. levis
Productus inflatus
Composita subquadrata

No. 112.—Location: Falling Springs Dist., on road 0.45 mi. N. E. of Rapp School or 1.7 mi. S. W. of Falling Springs (Renick).

Fossils:

Triplophyllum Pellense
Pentremites Godoni
Pentremites pyriformis
Crinoid indet.
Fistulipora sp.
Stenopora sp.
Fenestella tenax
Archimedes Proutanus var.
Polypora sp.
Orthotetes Kaskaskiensis
Diaphragmus elegans
Camarophoria explanata
Spirifer Pellaensis
Spiriferina transversa
Composita subquadrata
Cliothyridina sublamellosa
Phanerotrema sp.

No. 113.—Location: Falling Springs Dist., on road 0.4 mi. N. E. of Rapp School or 1.7 mi. S. W. of Falling Springs (Renick).

Fossils:

Triplophyllum Pellenese
Pentremites sp.
Crinoid indet.
Fistulipora sp.
Stenopora sp.
Archimedes sp.
Composita trinuclea?
Cliothyridina sublamellosa

No. 134.—Location: Blue Sulphur Dist., just E. of Spotts Ridge along road 2 mi. W. of Pierceys Mill; elevation, 1790′ B.

Fossils:

Fistulipora sp.
Stenopora sp.
Fenestella tenax?
Archimedes terebriformis
Polypora sp.

Greenville Shale.

No. 65.—Location: Lewisburg Dist., along Midland Trail 1.4 mi. N. W. of Richlands P. O.; elevation, 2050′ B.

Fossils:

Crinoid indet.
Fenestella sp.
Archimedes sp.
Polypora sp.
Orthotetes Kaskaskiensis
Productus ovatus
Diaphragmus elegans
Spirifer Pellaensis
Spiriferina spinosa
Composita trinuclea
Caneyella Wapanuckensis?
Orthoceras sp.

No. 78.—Location: Williamsburg Dist., along Midland Trail 1.2 miles N. W. of Alta P. O.; elevation, 2230′ B.

Fossils:

Crinoid indet.
Fenestella sp.
Orthetetes Kaskaskiensis
Caneyella Wapanuckensis?
Caneyella percostata?

Union Limestone.

No. 64.—Location: Lewisburg Dist., along Midland Trail 0.3 mi. N. W. of Richlands P. O.; elevation, 1990′ B.

Fossils:

Triplophyllum Pellense
Syringopora sp.
Pentremites Godoni
Pentremites pyriformis
Crinoid indet.
Fenestella sp.
Archimedes sp.
Spiriferina spinosa
Composita trinuclea
Cliothyridina sublamellosa
Eumetria Verneuiliana

No. 76.—Location: Williamsburg Dist., along Midland Trail 1.1 miles N. W. of Alta P. O.; elevation, 2190′ B.

Fossils:

Pentremites Godoni
Pentremites pyriformis
Crinoid indet.
Spiriferina spinosa?
Eumetria Verneuiliana

No. 77—Location: Williamsburg Dist., along Midland Trail 1.1 miles N. W. of Alta P. O.; elevation, 2200′ B.

Fossils:

Triplophyllum Pellense
Pentremites pyriformis
Crinoid indet.
Fenestella tenax
Archimedes sp.
Productus inflatus
Spiriferina spinosa?

Pickaway Limestone.

No. 74.—Collection lost.

No. 138.—Location: Irish Corner Dist., Acme Limestone Quarry 1 mi. W. of Fort Spring.

Fossils:

No fossils identified.

Taggard Limestone.

No. 75.—Location: Williamsburg Dist., along Midland Trail 1.0 mile N. W. of Alta P. O.; elevation, 2150′ B.

Fossils:

Triplophyllum Pellense
Chonetes sericeus
Productus inflatus
Diaphragmus elegans
Spirifer Pellaensis
Spiriferina transversa?
Composita sp.

No. 103.—Location: Fort Springs Dist., 1 mi. N. of Fort Spring; elevation, 1800′ B.

Fossils:

Crinoid indet.
Orthotetes Kaskaskiensis
Eumetria Verneuiliana

Patton Limestone.

No. 62.—Collection lost.

No. 63.—Collection lost.

Sinks Grove Limestone.

No. 61.—Lewisburg District, along Midland Trail 0.75 mi. W. of corporate limits of Lewisburg; elevation, 2190′ B.

Matrix: This is a brownish arenaceous shale. While the material at hand is not now calcareous it is evident that it was formerly calcareous, for there are innumerable cavities formerly occupied by crinoid stems, bryozoa, and a few brachiopods. There is also a fragment of dark limestone.

Fossils:

Crinoid stems.
Fenestella sp.
Bryozoa (branching).
Spirifer Pellaensis Weller
Spiriferina?

Comment: Only imperfect impressions are retained in the shale.

Hillsdale Limestone.

No. 17.—Location: Lewisburg Dist., on Midland Trail at Wagner Hill 0.1 mi. E. of corporate limits of Lewisburg (same location as Coll. No. 27); elevation, 2260′ B.

Matrix: This is a gray, argillaceous, non-calcareous shale. The imprints of the fossils are stained with limonite.

Fossils:

Crinoid stems (very few and small).
Fenestella elevatipora (?) Ulrich.
Orthotetes Kaskaskiensis (?) McChesney
Productus sp.
Spirifer Pellaensis Weller.
Spiriferina transversa McChesney.
Allerisma clavatum (?) McChesney (small)
Pelecypod.

Comment: See comment under Collection No. 27.

No. 27.—Location: Lewisburg Dist., (same location as Coll. No. 17); elevation, 2260′ B.

Matrix: This is a greenish-gray, argillaceous, non-calcareous shale. The imprints of the fossils are stained with limonite.

Fossils:

Fenestella elevatipora (?) Ulrich (abundant)
Orthotetes Kaskaskiensis (?) McChesney
Spirifer Pellaensis Weller (numerous)
Spiriferina transversa McChesney
Eumetria (?)
Aviculopecten sp.
Allerisma clavatum (?) McChesney (small)
Pelecypod

Comment: The fossils are fragments of imprints, of which the specific determination of the Spirifer and Spiriferina only are exact. The Spirifer, Fenestella, and fragments of pelecypods are numerous.

When collected the specimens were supposed to be from the Maccrady Shale, but they emphasize the necessity of dividing what has been called the Maccrady into at least two portions, a lower or Maccrady proper and an upper or basal portion of the St. Louis, the two being separated by a disconformity. The collection clearly comes from above the plane of disconformity.

No. 20.—Location: White Sulphur Dist., along C. & O. R. R. cut south of Caldwell and 0.1 mi. E. of Monroe Draft, (same location as Colls. Nos. 21 and 136); elevation, 1760′ B.

Matrix: This is a dark-gray, cherty limestone.

Fossils:

Fenestella tenax Ulrich
Orthotetes Kaskaskiensis McChesney

Comment: This is a true Hillsdale chert, but it does not contain Lithostrotion.

No. 21.—Location: White Sulphur Dist., (same location as Colls. Nos. 20 and 136, but a few feet lower than Coll. No. 20); elevation, 1750′ B.

Matrix: This is a dark-gray limestone.

Fossils:

Crinoid stems
Orthotetes Kaskaskiensis McChesney
Composita sp.
Fenestella tenax (?) Ulrich
Bryozoa (branching)

Comment: This bed is six feet below the cherty Hillsdale, and at the top of yellowish laminated limestone. There seems to be a gradation from a yellowish calcareous shale below with calcite in joints and with slickensides, into shale and gray limestone above, this portion being six feet or so thick at this point, and then into the thick cherty limestone (Hillsdale chert) above.

No. 136.—Location: White Sulphur Dist., (same location as Colls. Nos. 20 and 21); elevation, 1750′ B.

Fossils:

Ostracoda indet.

No. 60.—Location: Lewisburg Dist., along Midland Trail at western corporate limits of Lewisburg; elevation, 2125′ B.

Matrix: This is a weathered, dark-gray, cherty limestone. Some of it is calcareous, and some of it does not effervesce with acid.

Fossils:

Syringopora sp.
Crinoid stems
Pentremites sp.
Melonites sp. (plates and spine)

Comment: This collection also is from the Hillsdale chert, but in a locality without Lithostrotion.

No. 71.—Location: Williamsburg Dist., along Midland Trail 0.9 mi. N. W. of Alta P. O.; elevation, 2120′ B.

Matrix: This is a gray chert, non-calcareous, weathered partings revealing numerous silicified fossils.

Fossils:

Crinoid stems.
Fenestella sp.
Orthotetes Kaskaskiensis McChesney
Productus ovatus Hall
Diaphragmus elegans Norwood and Pratten

Comment: This is a distinct Hillsdale chert, with silicified fossils but without Lithostrotion.

No. 98.—Location: Irish Corner Dist., along county road 1.4 mi. W. of Altavista School; elevation, 2160′ B.

Matrix: This is a dark-gray limestone in the shaly portion just below cherty Hillsdale and above a yellowish, argillaceous shale. The total thickness up to the cherty beds is about ten feet.

Fossils:

Orthotetes Kaskaskiensis McChesney (abundant)
Allerisma clavatum McChesney
Sphenotus extensus Moore
Aviculopecten sp.
Pelecypod
Gastropod
Lepetopsis levettei White
Ostracoda

Comment: See general discussion following No. 27.

No. 99.—Location: Irish Corner Dist., along county road 1.4 mi. W. of Altavista School, (just above Coll. No. 98); elevation, 2165′ B.

Matrix: This is a dark-gray limestone.

Fossils:

Crinoid stems
Fenestella sp.
Bryozoa (branching)
Orthotetes Kaskaskiensis McChesney (numerous)
Productus ovatus Hall
Diaphragmus elegans Norwood and Pratten
Echinoconchus alternatus Norwood and Pratten
Spirifer Pellaensis Weller
Spirifer (?)
Spiriferina transversa McChesney
Spiriferina spinosa Norwood and Pratten
Composita sp.
Aviculopecten sp.

Comment: The collection is from Hillsdale chert that is ten to fifteen feet thick but contains no Lithostrotion.

No. 100.—Location: Irish Corner Dist., along county road 1.35 mi. W. of Altavista School; elevation, 2200′ B.

Matrix: This is a dark-gray, shaly limestone, from just above cherty layers.

Fossils:

Crinoid stems
Fenestella tenax Ulrich
Bryozoa (branching)

Orthotetes Keokuk Hall
Orthotetes Kaskaskiensis McChesney
Productus (?)
Diaphragmus elegans Norwood and Pratten
Spirifer Pellaensis Weller
Spiriferina spinosa (?) Norwood and Pratten
Composita trinuclea Hall
Composita sp.
Lepetopsis levettei (?) White

Comment: This collection is from farther up in the Hillsdale chert than collection No. 99; it contains no Lithostrotion.

No. 101.—Location: Irish Corner Dist., along county road 1.3 mi. W. of Altavista School.

Matrix: This is a light-yellow, non-calcareous, argillaceous shale, with numerous minute cavities of forms that have been dissolved out.

Fossils:

Crinoid stems
Fenestella sp.
Spirifer Pellaensis Weller
Many minute and indistinct cavities

Comment: There are striations that possibly may be impressions of fibrovascular bundles of plants.

The beds are about twelve feet above a heavy ledge of Hillsdale chert, in which twelve feet there are masses of blue limestone.

No. 107.—Location: Blue Sulphur Dist., in road at church 0.2 mi. S. of Asbury; elevation, 2115′ B.

Matrix: This is a grayish chert, non-calcareous.

Fossils:

Lithostrotion canadense (basaltiforme)
Syringopora sp.

Comment: This species of **Lithostrotion** is here near the base of the Hillsdale or St. Louis. Farther west it is sometimes **Lithostrotion canadense** and sometimes **Lithostrotion proliferum** that is reported from near the base.

No. 108.—Location: Irish Corner Dist., in new road cut on Seneca Trail 0.6 mi. N. W. of Organ Cave P. O.; elevation, 2215′ B.

Matrix: This is a dark-gray cherty limestone.

Fossils:

Lithostrotion canadense (basaltiforme) Castlenau. (In the chert)
Fenestella sp.
Bryozoa (branching). (In shale accompanying the chert)
Bryozoa (encrusting). (In shale accompanying the chert)
Spirifer (?)

Comment: On comparing the fossils found in the fossiliferous shale above the red Maccrady Shale with fossils found in the beds lower down in the series the faunal break is very evident. There is no similarity excepting in forms with considerable vertical range in the Mississippian, as **Orthotetes Kaskaskiensis, O. Keokuk, Productus ovatus, Composita trinuclea,** and **Fenestella tenax,** all of which range farther down than Warsaw beds but do not range to the Broad Ford, which, as thus far reported, is the next lower bed in Greenbrier County. Of the species actually identified the break is therefore complete in West Virginia at the base of the fossiliferous beds here considered. Further, with the exception of the long-range forms mentioned, there is an absence of forms especially distinctive of the Warsaw (including the Spergen). **Endothyra baileyi Zaphrentis elliptica, Palaecis carinata, Cladochonus bucheri, Pentremites conoideus, Worthenopora spinosa, Rhipidomella dubia, Productus magnus,** and **Spirifer lateralis** are not among the forms found in the Greenbrier collections; and of the species here identified none is mentioned by R. P. Whitfield[1] as found at Spergen Hill, and but one (**Spiriferina spinosa**) is mentioned (in the same reference, p. 96) as found in the Spergen Hill fauna of Alabama.

In noting the positions from which collections were made in the shaly portion below the heavy beds of Hillsdale chert it is found that in some places the shale is earthy, light-brown, and non-calcareous though with imprints of fossils (Collections 17 and 27). In others (Collections 21 and 98) it grades upward from the light-brown, non-calcareous shale with imprints of fossils to a shaly limestone beneath beds of Hillsdale chert ten or twelve feet in thickness. In places (Collections 107 and

[1]R. P. Whitfield, "On the Fauna of . . . Spergen Hill . . ." Bull., Am. Museum Nat. Hist. Vol. 1, Article 5, p. 96; 1882.

108) the overlying chert bears **Lithostrotion**; while in other places **Lithostrotion** is absent (Collections 20, 60, 71, 99, 100, and 101), and yet the thick mass of limestone is the Hillsdale chert. In and above the heavy beds of Hillsdale chert are beds of shale similar both in character and in fossil content to that found below the heavy beds.

It is customary to describe the base of the St. Louis as at the lowest horizon where **Lithostrotion** occurs[2], but Weller and Butts both describe other shaly beds as present beneath the **Lithostrotion**-bearing beds, which shaly beds they also include in the St. Louis[3].

It therefore appears to the writer that so far as West Virginia is concerned the succession of fossiliferous beds here considered, which have heretofore been classified with the Maccrady, should be classified with the St. Louis, as marking the early stages of advance of the sea over the oxidized surface (of the Maccrady) below.

No. 130.—Location: Blue Sulphur Dist., 1 mi. S. of Asbury.

Fossils:

Triplophyllum Pellense
Fenestella sp.
Orthotetes Kaskaskiensis
Productus ovatus
Productus inflatus
Composita subquadrata

Discussion of Relation Between Maccrady and Hillsdale (St. Louis).

The collections numbered 17 and 27 are from the top beds between the Pocono (Broad Ford) below and the Hillsdale chert (St. Louis) above, the latter elsewhere containing **Lithostrotion.** The question is, What are these beds?

The beds under consideration are largely shales. They can be divided into two portions: a lower reddish shale that is not fossiliferous nor calcareous, and an upper portion that

[2]Stuart Weller, Geology of Hardin County, Bull. 41, Ill. Geol. Surv., p. 97; 1920.

[3]Stuart Weller, Geology of Hardin County, Bull. 41, Ill. Geol. Surv., p. 104; 1920.

Charles Butts, Mississippian Series in Eastern Kentucky, Kentucky Geol. Surv., Series 6, Vol. 7, pp. 121-123; 1922.

is a brownish, argillaceous shale, which, while it is non-calcareous in the samples numbered 17 and 27, has been calcareous in the past, for the shale is very porous, due to cavities formerly occupied by crinoid stems, bryozoa, and brachiopods. Between these two shales it is judged there is a plane of disconformity, at the surface of the lower red, dense, non-calcareous shale lying above still lower beds which at Saltville, Va., Charles Butts refers to the Price Formation, which is there the lowermost bed of the Mississippian System. The lowermost formation (Price) he correlates with the New Providence of Kentucky and Tennessee and with the Cuyahoga and Logan Formations of Ohio. It is immediately above these fossiliferous beds of the Price Formation that he finds the non-fossiliferous red Maccrady beds.

From the position and fossiliferous character of the horizon at which Collections 17 and 27 were made it appears (as stated by Butts[4] for the upper beds at Saltville) that they should be distinguished from the red Maccrady beds below and not be called by the same name.

In the succeeding collections numbers 21 and 98 are from limy beds in the shale below the cherty beds. The limestone layers do not contain **Lithostrotion** where the collections were made. Numbers 20, 60, 71, 99, 100, and 101 are from what is considered true Hillsdale chert where beds are massive but without **Lithostrotion.** Collections 107 and 108 are from Hillsdale chert where **Lithostrotion** is present.

POCONO SERIES.

No. 29.—Location: White Sulphur Dist., along Midland Trail 0.8 mi. S. E. of Caldwell P. O.; elevation, 1760′ B.

Matrix: This is a thin-bedded, somewhat micaceous, gray sandstone, calcareous in places and concretionary.

Fossils:

Plant fragments
Chonetes Illinoisensis Worthen?

[4]Charles Butts, Oil and Gas Possibilities at Early Grove, Scott County, Virginia, Bull 27, Va. Conservation and Development Commission, Va. Geol. Survey, 1927, pp. 11-13.

No. 31.—Location: White Sulphur Dist, along Midland Trail north of road 0.9 mi. S. E. of Caldwell P. O.; elevation, 1770′ B.

Matrix: This is a fine-grained, light-gray sandstone, thin-bedded, non-calcareous, with cracks stained with iron rust (limonite).

Fossils:

Impressions of plants (Calamites?)
Crinoid stems
Orthotetes Kaskaskiensis McChesney?
Syringothyris textus Hall?
Pelecypod (fragment)
Gastropod (low spire, cast)
Leptaena? sp.

Broad Ford Sandstone.

No. 3.—Location: White Sulphur Dist., along C. & O. R. R. cut 0.7 mi. S. E. of Caldwell, (same location as Coll. No. 23); elevation, 1800′ B.

Matrix: This is a dark-gray, calcareous conglomerate of white quartz pebbles cemented with iron oxide and lime. A portion is of pure limonite in which impressions of fragments of fossils are preserved.

Fossils:

Crinoid stems
Part of head of crinoid (suggesting Agassizocrinus)
Fenestella sp.
Syringothyris textus Hall?
Avicula circulus Shumard
Three types of gastropods
Phillipsia sp.

No. 23.—Location: White Sulphur Dist., (same location as Coll. No. 3); elevation, 1790′ B.

Matrix: This is a dark-gray, calcareous conglomerate of white quartz pebbles cemented with iron oxide and lime. A portion is of pure limonite in which impressions of fragments of fossils are preserved.

Fossils:

Crinoid stem
Fenestella sp.
Productus sp.

Rhipidomella sp.
Two Pelecypods
Orthotetes Kaskaskiensis McChesney?

No. 5.—Location: Williamsburg Dist., along Midland Trail, on east side of Brushy Ridge, (same location as Coll. No. 67); elevation, 2275′ B.

Matrix: This is of two types. The first is a dark brownish-gray, shaly sandstone, slightly micaceous, non-calcareous. The second is a nearly white, non-calcareous, fine-grained sandstone, somewhat micaceous.

Fossils:

Syringopora sp.
Rhipidomella sp.
Two Pelecypods
One Gastropod (low spire)

No. 67. Location: Williamsburg Dist., (same location as Coll. No. 5; elevation, 2275′ B.

Matrix: This is a greenish-gray, concretionary sandstone, with partings deeply stained by limonite. In two specimens the surface of a fissure vein is lined with quartz crystals; other fissures contain asphaltum.

Fossils:

Crinoid stem
Pelecypod
Bellerophon sp.

No. 15.—Location: Frankford Dist., along county road 0.5 mi. N. W. of Anthony, (same location as Coll. No. 97); elevation, 1965′ B.

Matrix: This is a dark-gray, shaly sandstone, somewhat micaceous, non-calcareous, with partings deeply stained with limonite.

Fossils:

Fenestella sp.
Schuchertella lens (White)?

No. 97.—Location: Frankford Dist., (same location as Coll. No. 15); elevation, 1965′ B.

Matrix: This a greenish gray, badly weathered limestone, or calcareous sandstone, with somewhat of mica. The entire fossiliferous bed is about a foot thick.

Fossils:

Fenestella sp.
Schuchertella lens (White)?
Camarotoechia sp.
Spirifer sp.
Bellerophon sp.

No. 22.—Location: White Sulphur Dist., along C. & O. R. R. cut 0.1 mi. W. of Caldwell Station; elevation, 1790′ B.

Matrix: This is a grayish shale, clayey, non-calcareous, slightly micaceous, and with stains of limonite along cracks. Some of the shale reveals slickensides.

Fossils:

Impressions of plants.

No. 28.—Location: White Sulphur Dist., along Midland Trail 0.7 mi. S. E. of Caldwell P. O.; elevation, 1730′ B.

Fossils:

Plant Remains.

DEVONIAN.

CHEMUNG SERIES.

No. 4.—Location: White Sulphur Dist., along Midland Trail, 1.1 miles S. E. of Caldwell, (same location as Coll. No. 30); elevation, 1750′ B.

Matrix: This is a light-gray, fine-grained, slightly micaceous sandstone, non-calcareous, weathered on the outside to a light-brown. The sandstone contains three white rounded quartz pebbles.

Fossils:

Crinoid stems
Douvillina cayuta var. graciliora Clarke and Swartz

No. 30.—Location: White Sulphur Dist., (same location as Coll. No. 4); elevation, 1750′ B.

Matrix: This is a dark-gray, non-calcareous sandstone, weathering to a light-brown.

Fossils:

Crinoid stem
Douvillina cayuta? Hall
Douvillina cayuta var. graciliora Clarke and Swartz

Camarotoechia contracta Hall
Spirifer mucronatus var. posterus Hall and Clarke
Pelecypod (fragment)

No. 18.—Location: White Sulphur Dist., county road along Harts Run 1.4 miles S. of Harts Run School, at bridge across Harts Run; elevation, 1950′ B.

Matrix: This is a black, argillaceous, non-calcareous shale in which the fossils appear bright red.

Fossils:

Douvillina cayuta Hall
Schizophoria striatula Schlotheim
Atrypa hystrix Hall
Spirifer disjunctus Sowerby
Ambocoelia umbonata Conrad (abundant)

No. 24.—Location: White Sulphur Dist., along C. & O. R. R. cut 0.7 mi. S. E. of Caldwell Station; elevation, 1795′ B.

Matrix: This is a weathered non-calcareous, somewhat fragmental, micaceous, shaly sandstone with carbonized wood and with impressions of plants. One fragment has both small rounded quartz pebbles and the impression of a **Spirifer**. There is evidence of slickensides but not abundant.

Fossils:

Carbonized wood, impressions of plants some of which seem indistinct impressions of calamites.
Spirifer disjunctus (?) Sowerby

No. 25.—Collection lost.

No. 26.—Location: White Sulphur Dist., along C. & O. R. R. cut 1 mile S. E. of Caldwell Station; elevation, 1800′ B.

Matrix: This is a dark-gray, fine-grained, non-calcareous sandstone with partings stained with limonite.

Fossils:

Crinoid stems (few)
Douvillina cayuta var. graciliora Clarke and Swartz
Productella lachrymosa Conrad
Dalmanella tioga Hall
Schuchertella chemungensis Conrad
Spirifer disjunctus Sowerby
Cypricardinia elegans Clarke and Swartz
Leptodesma (?) (fragments)
Two Pelecypods (fragments)
Orthoceras (?) fragments)

No. 32.—Location: White Sulphur Dist., along C. & O. R. R. 1.3 miles S. E. of Caldwell P. O.; elevation, 1800′ B.

Matrix: A dark-gray, fine-grained, non-calcareous sandstone, with partings deeply stained with limonite.

Fossils:

Crinoid stems (few)
Douvillina cayuta var. graciliora Clarke and Swartz (many)
Schuchertella chemungensis Conrad
Dalmanella tioga Hall (few)
Pelecypod

Comment: The sandstone contains a mass of crinoid stems (impressions) and of **Douvillina cayuta var. graciliora**, all most evident along partings deeply stained with limonite.

No. 33.—Location: White Sulphur Dist., along C. & O. R. R. 1.3 miles S. E. of Caldwell P. O.; elevation, 1800′ B.

Matrix: It is essentially a dark limestone weathered dark-brown. The thickest fragment is 30 mm. (1.2 inches) thick. The three thinner fragments retain but little of the lime of the shells. These fragments are a deeper brownish shale—an arenaceous, slightly micaceous, shaly sandstone.

Fossils:

Douvillina cayuta var. graciliora Clarke and Swartz
Dalmanella tioga Hall
Spirifer disjunctus Sowerby

No. 34.—Location: White Sulphur Dist., along C. & O. R. R. 1.3 miles S. E. of Caldwell P. O.; elevation, 1800′ B.

Matrix: This is a dark-gray, shaly sandstone with thin partings stained brown by limonite.

Fossils:

Crinoid stems
Douvillina cayuta var. graciliora Clarke and Swartz (many)
Spirifer disjunctus Sowerby

No. 35.—Location: White Sulphur Dist., along C. & O. R. R. 1.4 miles S. E. of Caldwell P. O.; elevation, 1800′ B.

Matrix: This is a black, fine-grained, dense sandstone with partings stained by limonite.

Fossils:

Crinoid stems
Douvillina cayuta Hall
Productella lachrymosa
Camarotoechia contracta Hall
Spirifer disjunctus Sowerby
Atrypa reticularis Linné

No. 36.—Location: White Sulphur Dist., along C. & O. R. R. 1.45 miles S. E. of Caldwell P. O.; elevation, 1805′ B.

Matrix: This is a thin, grayish, fine-grained, slightly micaceous sandstone.

Fossils:

Crinoid stems
Dalmanella tioga Hall
Spirifer mucronatus var. posterus Hall and Clarke

Comment: This is essentially a layer of crinoidal sandstone, without contents that indicate exact horizon in the Chemung. Between the levels at which Collections 35 and 36 were made there are at least two similar horizons of crinoidal sandstone.

No. 37.—Location: White Sulphur Dist., along Midland Trail 1.5 miles S. E. of Caldwell P. O. and 0.1 mi. N. of "The Pines"; elevation, 1850′ B.

Matrix: This is a dark-gray, fine-grained, slightly micaceous, non-calcareous sandstone with partings stained by limonite. The fossils are chiefly in the partings.

Fossils:

Asphaltum (a few patches)
Impressions of linear leaves
Impressions of stems
Bryozoa (branching)
Crinoid stems (a few)
Schuchertella chemungensis Conrad
Productella lachrymosa Conrad (several)
Camarotoechia contracta Hall (many)
Spirifer mucronatus var. posterus Hall and Clarke (several)
Ambocoelia umbonata Conrad (several)
Pelecypod
Platyceras marylandicum Clarke and Swartz

Comment: Here within ten feet of the road are three fossiliferous layers, the top one of which has an abundance of **Ambocoelia umbonata**. The presence of **Productella lachry-**

mosa, **Camarotoechia contracta,** and **Ambocoelia umbonata** determine that the strata are in the Chemung. Of the **Spirifers** two specimens preserve nicely the surface markings. These are angular lines of growth, weathered imbrications, on sinus and both lateral slopes of the mucronate shell. Of **Platyceras** the forms are not sufficiently compressed to be **P. compressum,** and they are too decidedly nodose to accord fully with **P. marylandicum. Camarotoechia contracta** is reported from the Lower and Middle Chemung. **Cladochonus** is recognized in the Portage and Lower Chemung. The present fossil is only an impression of such a branching form.

It is noticeable that in the collection there is no **Atrypa,** common in the Middle and Upper Chemung, no **Spirifer disjunctus,** and no **Douvillina.** Even though recognized Portage is not close at hand it seems necessary to consider this collection as made near the base of the Chemung, and at an horizon marked by an abundance of stems and linear leaves.

No. 38.—Location: White Sulphur Dist., C. & O. R. R. cut just west of Harts Run P. O., elevation, 1800′ B.

Matrix: This is a light yellowish-gray, fine-grained, shaly sandstone, non-calcareous and deeply stained with limonite.

Fossils:

Bryozoa (branching)
Fenestella sp.
Leptostrophia perplana var. nervosa Hall
Douvillina cayuta Hall
Douvillina cayuta var. graciliora Clarke and Swartz
Productella lachrymosa Conrad
Dalmanella tioga Hall
Schizophoria striatula Schlotheim
Atrypa hystrix Hall
Spirifer marcyi var. superstes Clarke and Swartz
Ambocoelia umbonata Conrad

No. 39.—Location: (Same as Coll. No. 38); elevation, 1800′ B.

Matrix: This is a dark-gray, slightly micaceous, shaly sandstone, non-calcareous and deeply stained with limonite.

Fossils:

Leptostrophia perplana var. nervosa Hall
Douvillina cayuta Hall
Camarotoechia contracta Hall

Spirifer mucronatus var. posterus Hall and Clarke
Ambocoelia umbonata Conrad
Grammysia subarcuata Hall
Pterinea chemungensis Conrad
Leptodesma medon Hall
Cypricardella marylandica Clarke and Swartz

Comment: Fully half of the individuals are **Camarotoechia** and nearly half of the species are **Pelecypods.**

No. 40.—Location: (Same location as Coll. No. 38); elevation, 1800′ B.

Matrix: Chiefly this is a light brownish-gray shaly sandstone, slightly micaceous, non-calcareous, and very fossiliferous. Some of it contains minute pyrites. With this is a dark-gray shale, otherwise like the above. This seems to be the original type of the matrix, which by weathering turns into the light-brownish shale.

Fossils:

Carbonaceous fragment as of a linear leaf
Orbiculoidea media Hall
Leptostrophia perplana var. nervosa Hall (few)
Douvillina cayuta Hall (few)
Schuchertella chemungensis Conrad (few)
Productella lachrymosa Conrad (few)
Schizophoria striatula Schlotheim (several)
Camarotoechia contracta Hall (several)
Atrypa reticularis Linne (one)
Atrypa hystrix Hall
Spirifer disjunctus Sowerby (few)
Spirifer marcyi var. superstes Clark and Swartz (many)
Spirifer mucronatus var. posterus Hall and Clark (many)
Ambocoelia umbonata Conrad (few)
Palaeoneilo plana Hall (one)
Leptodesma medon Hall (many)

Comment: This collection is remarkable for the number of **Spirifer mucronatus var. posterus** that are present—a veritable shell bank composed largely of ventral valves, in many of which impressions of the exquisite zigzag markings on the lamellose shells are perfectly preserved. No evidence of the small teeth are noted. Impressions of three dorsal valves were present one of which was carefully ground away in a search for a possible median septum. As no trace whatever of one was found these **Spirifers** must be assigned to the species named and not to **S. mesacostalis.** Likewise the impressions of **S. marcyi** were carefully examined for evidence of the presence

of a median septum, the absence of which placed these beautifully punctate forms with **S. marcyi** rather than with **Spiriferina,** a form that appears in the succeeding Mississippian.

No. 41.—Location: (Same as Coll. No. 38); elevation, 1800′ B.

Matrix: This is a dark-gray, fine-grained, non-calcareous sandstone with stain of limonite along partings. There is pyrites in places.

Fossils:

Minute fragments of plants
Crinoid stems
Leptostrophia perplana var. nervosa Hall
Douvillina cayuta Hall
Schuchertella chemungensis Conrad
Productella lachrymosa Conrad
Schizophoria striatula Schlotheim
Camarotoechia sp.
Atrypa reticularis Linne
Atrypa hystrix Hall
Ambocoelia umbonata Conrad
Leda sp.
Pterinea sp.
Cypricardella sp.
Cypricardinia elegans Clarke and Swartz
Manticoceras patersoni Hall

No. 42.—Location: (Same location as Coll. No. 38); elevation, 1800′ B.

Matrix: This is a dense, dark-gray, thin-bedded, non-calcareous sandstone (a flagstone) with partings marked by carbonaceous fragments, or minute flakes of mica, or both. There is but little limonite.

Fossils:

Small, broken, carbonized fragments of leaves and stems of plants.

Comment: The fragments lie in a bedding plane. A small nodule-like mass is indefinite, but suggestive of **Striatula.**

No. 43.—Location: (Same location as Coll. No. 38); elevation, 1800′ B.

Matrix: The matrix is of three kinds: first, there is a dense, dark-yellowish gray, thin-bedded, non-calcareous sandstone, somewhat micaceous and containing a little pyrite. Sec-

ond, there is an irregularly bedded, argillaceous shale, dark-gray in color and non-calcareous. Third, there is a dark, thin-bedded limestone containing crystals of calcite.

Fossils:

First, in the sandstone:
Leptostrophia perplana var. nervosa Hall
Douvillina cayuta Hall

Second, in the shale:
Impressions of crinoid stems
Leptostrophia perplana var. nervosa Hall
Douvillina cayuta var. graciliora Clarke and Swartz
Dalmanella tioga Hall
Spirifer disjunctus Sowerby
Ambocoelia umbonata Hall

Third, in the limestone:
Crinoid stems
Douvillina cayuta var. graciliora Clarke and Swartz
Dalmanella tioga Hall
Ambocoelia umbonata Conrad

No. 53.—Location: White Sulphur Dist., on Midland Trail 0.7 mi. W. of Virginia-West Virginia boundary; elevation, 2215′ B.

Matrix: This is a gray, slightly micaceous, shaly sandstone, non-calcareous, with partings of limonite.

Fossils:

Crinoid stems (many)
Schuchertella chemungensis Conrad (one)
Dalmanella tioga Hall (many)
Schizophoria striatula Schlotheim (two)
Camarotoechia contracta Hall (two)
Spirifer disjunctus Sowerby (several)
Spirifer mucronatus var. posterus Clarke and Swartz (several)
Atrypa hystrix Hall (one)
Ambocoelia umbonata Conrad (several)
Three Pelecypods (fragments)
One Gastropod (fragment)

Comment: The assemblage indicates a central position in the Chemung.

No. 116. Location: Anthony Creek Dist., on Twomile Run 2.1 mi. N. of Neola; elevation, 2150′ B.

Fossils:

Crinoid indet.
Camarotoechia congregata var. parkheadensis
Spirifer disjunctus

No. 129—Location: White Sulphur Dist., on Slash Lick Run 1.1 mi. S. of Wild Meadow School; elevation, 2125′ B.

Fossils:

Crinoid indet.
Camarotoechia congregata var. parkheadensis

PORTAGE SERIES.

No. 12.—Location: White Sulphur Dist., along C. & O. R. R. 0.2 mi. E. of Harts Run, (same location as Coll. No. 48); elevation, 1850′ B.

Matrix: A dark and grayish irregularly bedded shale, non-calcareous, somewhat arenaceous, deeply stained with oxide of iron.

Fossils:

Craniella hamiltoniae Hall
Schuchertella chemungensis Conrad
Productella lachrymosa Conrad
Pelecypod

No. 48.—Location: White Sulphur Dist., (same location as Coll. No. 12); elevation, 1850′ B.

Matrix: This is a dark and grayish irregularly bedded shale, non-calcareous, somewhat arenaceous, deeply stained with oxide of iron.

Fossils:

Cast of a limb or trunk
Probeloceras lutheri
Fucoid impressions
Trails, as of annelids
Productella lachrymosa Conrad
Ambocoelia umbonata Conrad
Pelecypod
Atrypa spinosa

No. 16.—Location: Anthony Creek Dist., on east side of Slabcamp Mountain 1.5 miles N. of Sue; elevation, 2125′ B.

Matrix: This is a dark-green, thin-bedded, argillaceous, non-calcareous, slightly micaceous shale, some of it black with plant fragments.

Fossils:

Carbonaceous fragments of plants
Trails (annelids)
Schizophoria striatula Schlotheim
Paracardium doris Hall
Manticoceras patersoni Hall?

Comment: While **Paracardium** is found both in the Genesee and in the basal member of the Portage (Naples), **Manticoceras** (?) and **Schizophoria striatula** emphasize the Portage affinities. Unfortunately there is but a single impression of each of these fossils and these are not perfect.

No. 45.—Location: White Sulphur Dist., along second-class road 0.05 mi. E. of Harts Run P. O.; elevation, 1800′ B.

Matrix: This is a light-grayish, fine-grained sandstone, slightly micaceous, non-calcareous, with cracks stained by limonite.

Fossils:

Plant Remains

No. 46.—Location: White Sulphur Dist., along Harts Run just south of C. & O. R. R. fill; elevation, 1775′ B.

Matrix: This is a grayish, somewhat micaceous, fine-grained sandstone, non-calcareous, outside deeply stained with oxide of iron.

Fossils:

Lingula sp.
Leptostrophia perplana var. nervosa Hall
Douvillina cayuta Hall
Schuchertella chemungensis Conrad
Productella lachrymosa Conrad
Schizophoria striatula Schlotheim
Atrypa spinosa Hall
Ambocoelia umbonata Conrad
Two Pelecypods (fragments)

No. 47.—Location: White Sulphur Dist., along Harts Run just south of C. & O. R. R. fill; elevation, 1785′ B.

Matrix: This is a light gray, fine-grained, micaceous sandstone, stained along the partings; non-calcareous.

Fossils:

Impressions of longitudinal striations as of wood fiber
Trails (annelids)

Comment: Some of the trails have faint undulations, as of parapodia. The trails form a network along one plane.

No. 52.—Location: White Sulphur Dist., on Midland Trail, just west of Virginia-West Virginia boundary; elevation, 2400′ B.

Matrix: This is a gray and light-yellowish, almost white, fine-grained, somewhat micaceous shale, non-calcareous. Cracks are lined with wash of limonite.

Fossils:

Plant Remains (Algae?)

No. 58.—Location: Anthony Creek Dist., along Howard Creek road 1 mile N. E. of Wild Meadow School; elevation, 2055′ B.

Matrix: The shale is greenish, argillaceous and non-calcareous. One fragment has a lighter shade of green along with a brownish-yellow weathered phase.

Fossils:

Buchiola livoniae Clarke
Coleolus tenuicinctus Hall
Probeloceras lutheri Clarke

Comment: **Buchiola livoniae**: The low lobes and rounded furrows are marked by curved lines, which in one form are preserved as diagonal lines upon the sides of the furrows. Complete shells are not preserved but the characteristics named belong to **Buchiola livoniae** and not to **B. halli** nor to **B. retrostriata**.

Probeloceras lutheri: While a complete shell revealing lobes and saddles is not present the wide umbilical, the band, and the smooth shell, refer the form definitely to **Probeloceras lutheri**.

Neither of the two forms named is reported either from the Marcellus or from the Hamilton, both below the Genesee; but both are reported from the Genesee and also from the basal part of the Portage Series (Naples fauna), which comes just above the Genesee. The fossils, therefore, indicate distinctly that the horizon is not below the Genesee but may be in the basal

portion of the Portage. The character of the matrix allies the material with the Portage rather than the Genesee. With such a relation the collection is referred to the Portage, but with a question mark added.

No. 59.—Location: Anthony Creek Dist., 0.4 mi. N. E. of Wild Meadow School; elevation, 2200′ B.

Matrix: This is a light-greenish argillaceous shale, non-calcareous.

Fossils:

Buchiola livoniae Clarke
Styliolina fissurella Hall
Manticoceras patersoni Hall (?)

Comment: The **Styliolina** are very few in number. The **Cephalopod** has no band. The outside, while smooth in one sense, is lamellose, ornamented by a succession of undulations parallel to the margin of the shell. This does not correspond to any description at hand. The form seems to come nearest to **Manticoceras patersoni.**

Two of the forms are found both in the Genesee and in the basal part of the Portage (Naples), but **Manticoceras patersoni** is reported from the Portage only. The presence of **Manticoceras patersoni**, the scarcity of **Styliolina**, and the greenish character of the shale common in the Portage, unite in referring this shale to the Portage. The shale probably comes from close to the Genesee-Portage contact.

GENESEE SERIES.

No. 14.—Location: Anthony Creek Dist., along county road 0.3 mi. N. of Wiley's Crossing, (same location as Coll. No. 57); elevation, 1980′ B.

Matrix: This is a black fissile argillaceous shale, non-calcareous.

Fossils:

Buchiola livoniae Clarke
Paracardium doris Hall
Pterochaenia fragilis Hall
Styliolina fissurella Hall
Probeloceras lutheri Clarke

Comment: Of these forms the presence of **Paracardium doris** makes it evident that the strata are in the Genesee. For further comment see No. 57, a collection that was made in the same place later.

No. 57.—Location: Authony Creek Dist., (same location as Coll. No. 14); elevation, 1980′ B.

Matrix: This is a black fissile argillaceous shale, non-calcareous.

Fossils:

Buchiola livoniae Clarke
Paracardium doris Hall
Pterochaenia fragilis Hall
Styliolina fissurella Hall
Bactrites aciculus Hall
Probeloceras lutheri Clarke

Comment: Of these forms **Paracardium doris** is an index fossil of the Genesee, while **Pterochaenia fragilis, Buchiola livoniae**, and **Probeloceras lutheri** are also reported from the Naples fauna of the Portage Series. **Styliolina fissurella** is also found at lower horizons, but its abundance in this shale is significant, confirming the shale as Genesee.

No. 126.—Collection lost.

HAMILTON SERIES.

No. 51.—Location: White Sulphur Dist., along Jericho Draft road 2 miles N. of White Sulphur Springs; elevation, 1990′ B.

Fossils:

The black shale and its weathered product:
Schuchertella variabilis (?) P. and K.
Pholidops sp.
Ambocoelia umbonata Conrad
Anoplotheca acutiplicata Conrad
Buchiola halli Clarke
Styliolina fissurella Hall
Coleolus tenuicinctus Hall
Bellerophon leda Hall

The buff argillaceous phase:
Heliophyllum sp.
Crinoid stems
Schuchertella variabilis P. and K.

Orbiculoidea lodiensis var. media Hall
Nucula corbuliformis Hall
Paracyclas lirata Conrad
Phacops rana Green

No. 55.—Location: White Sulphur Dist., on Midland Trail 0.1 mi. S. of Greenbrier Hotel at White Sulphur Springs; elevation, 1975′ B.

Matrix: This is a very soft, light-buff, non-calcareous, argillaceous shale.

Fossils:

Lingula sp.
Buchiola halli Clarke
Nucula corbuliformis Hall
Coleolus tenuicinctus Hall

MARCELLUS SERIES.

No. 9.—Location: White Sulphur Dist., along improved road 0.8 mi. N. of junction of Dry Creek and Howard Creek at White Sulphur Springs; elevation, 1975′ B.

Matrix: This is a black, fissile, argillaceous, non-calcareous shale.

Fossils:

Bactrites aciculus Hall

No. 54.—Location: White Sulphur Dist., 1.1 miles N. E. of junction of Dry Creek and Howard Creek at White Sulphur Springs; elevation, 1880′ B.

Matrix: This is a bluish-green, argillaceous, non-calcareous shale, with slickensides and other surfaces coated with oxide of iron.

Fossils:

Lingula sp.
Orbiculoidea lodiensis var. media Hall

No. 135.—Location: White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; elevation, 1965′ B.

Fossils:

Liorhynchus limitare
Nucula corbuliformis
Styliolina fissurella
Paradiceras discoideum (?)

ORISKANY SERIES.

HUNTERSVILLE CHERT.

No. 125.—Location: White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs.

Fossils:

Orbiculoidea roederi (?)
Rhipidomella musculosa
Hipparionyx proximus
Anoplia nucleata
Camarotoechia oriskania
Spirifer cumberlandiae
Spirifer murchisoni
Anoplotheca dichotoma
Platyceras gebhardi

No. 128.—Location: White Sulphur Dist., on E. side of Bobs Ridge 1 mile S. W. of Wild Meadow School; elevation, 2079′ L.

Fossils:

Orbiculoidea roederi (?)
Spirifer cumberlandiae (?)
Spirifer murchisoni
Spirifer tribulis

RIDGELEY SANDSTONE.

No. 152.—Location: White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs.

Fossils:

Spirifer murchisoni
Spirifer arenosus
Rhipidomella musculosa

HELDERBERG SERIES.

BECRAFT LIMESTONE.

No. 1.—Location: White Sulphur Dist., at the southwest end of Bobs Ridge two miles northeast of White Sulphur Springs, (same location as Coll. No. 50); elevation, 1915′ B.

Matrix: This is a black cherty limestone, weathered yellowish-brown on the outside. The nodular cherty mass where cracked is sealed by thin bands of white calcite.

Fossils:

Favosites conicus Hall
Crinoid stem
Fenestella sp.
Dalmanites micrurus (Green)

No. 50.—Location: White Sulphur Dist., (same location as Coll. No. 1); elevation, 1920′ B.

Matrix: This is a dark-gray limestone, weathering on its surface into a light-buff, argillaceous material.

Fossils:

Schuchertella becraftensis (?) (Clarke)
Favosites conicus Hall
Crinoid stems
Streptelasma strictum Hall
Fenestella sp.
Schuchertella woolworthana (Hall)
Spirifer concinnus Hall
Dalmanites micrurus (Green)

No. 49.—Location: White Sulphur Dist., on east side of Bobs Ridge 2 mi. N. E. of White Sulphur Springs, (same location as Coll. No. 121); elevation, 1920′ B.

Matrix: This is a dark-blue limestone that weathers into a yellowish-brown shaly deposit.

Fossils:

Streptelasma strictum Hall
Favosites conicus Hall
Rhipidomella oblata (Hall)
Atrypa reticularis Hall
Spirifer concinnus (Hall)
Dalmanites sp.

No. 121.—Location: White Sulphur Dist., (same location as Coll. No. 49); elevation, 1920′ B.

Fossils:

Streptelasma strictum
Schuchertella woolworthana
Spirifer perlamellosus

No. 115.—Location: Anthony Creek Dist., 0.3 mi. S. E. of Alvon.

Fossils:

Favosites conicus
Pleurodictyum lenticulare
Spirifer (?) sp.
Dalmanites pleuroptyx

No. 123.—Location: White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; elevation, 1970′ B.

Fossils:

Schuchertella woolworthana
Rensselaeria subglobosa var. avus
Rensselaeria (?) sp.
Spirifer concinnus

No. 124.—Location: White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs; elevation, 1960′ B.

Fossils:

Rhipidomella assimilis
Dalmanites sp.

No. 151.—Location: White Sulphur Dist., near Eckle School 2.5 mi. N. of White Sulphur Springs.

Fossils:

Leptaena rhomboidalis
Dalmanites pleuroptyx
Atrypa reticularis
Favosites conicus
Rhipidomella assimilis
Spirifer concinnus var. progradius
Schuchertella woolworthana

NEW SCOTLAND MEMBER.

No. 122.—Location: White Sulphur Dist., on E. side of Bobs Ridge 1.35 mi. N. E. of White Sulphur Springs.

Fossils:

Rhipidomella oblata (?)
Schuchertella sp.
Spirifer sp.
Spirifer sp.
Leptaena rhomboidalis

Comment: Specimens poor but appear to be most nearly related to New Scotland forms.

SILURIAN.

SALINA SERIES.

BOSSARDVILLE MEMBER.

No. 120—Location: Anthony Creek Dist., 0.1 mile S. of Alvon.

Fossils:

Stromatopora constellata

NIAGARA SERIES.

No. 56. Location: Anthony Creek Dist., 200 feet west of the Keefer arch, 0.5 mi. W. of Alvon P. O.; elevation, 1950′ B.

Matrix: This is a dense gray limestone in which there are numerous cracks filled with white calcite.

Fossils:

Lioclema sp.

No. 118.—Location: Anthony Creek Dist., 0.3 mi. W. of Alvon; elevation, 2050′ B.

Fossils:

Camarotoechia (?) sp.

No. 119.—Location: Anthony Creek Dist., 0.1 mi. W. of Alvon.

Fossils:

Leperditia (?) sp.

CLINTON SERIES.

No. 127.—Location: Anthony Creek Dist., on Beaver Lick Mountain 1.3 mi. E. of Upper Little Creek School.

Fossils:

Camarotoechia neglecta

APPENDIX.

LEVELS ABOVE MEAN TIDE

RAILROAD LEVELS.

Chesapeake & Ohio Railroad—Main Line.

Miles from Ft. Monroe.	STATIONS.	Elevation. Feet.
308.0	Tuckahoe	2048
311.9	White Sulphur Springs	1930
314.9	Dickson	1860
315.5	Harts Run	....
317.3	Caldwell	....
319.8	Whitcomb	1705
322.8	Ronceverte	1670
326.5	Rockland	1663
329.0	Fort Spring	1636
330.3	Snow Flake	....
330.8	Frazier	....
332.6	Halfway	....
335.8	Alderson	1556

Chesapeake & Ohio Railroad—Greenbrier Branch.

Miles from Ronceverte.	Stations.	State.	County.	Elevation Feet.
0.0	Ronceverte	W. Va.	Greenbrier	1670
2.8	Whitcomb	W. Va.	Greenbrier	1705
4.6	North Caldwell	W. Va.	Greenbrier	1696
13.8	Keister	W. Va.	Greenbrier	1774
16.9	Anthony	W. Va.	Greenbrief	1800
24.4	Spring Creek	W. Va.	Greenbrier	1862
27.6	Renick	W. Va.	Greenbrier	1877
34.8	Droop Mountain	W. Va.	Pocahontas	1943
41.3	Beard	W. Va.	Pocahontas	2015
48.6	Seebert	W. Va.	Pocahontas	2064
50.9	Watoga	W. Va.	Pocahontas	
55.0	Buckeye	W. Va.	Pocahontas	2112
58.9	Marlinton	W. Va.	Pocahontas	2131
65.1	Clawson	W. Va.	Pocahontas	
73.9	Clover Lick	W. Va.	Pocahontas	2295
79.7	Sitlington	W. Va.	Pocahontas	2370
83.5	Cass	W. Va.	Pocahontas	2455
90.9	Hosterman	W. Va.	Pocahontas	2592
94.8	Boyer	W. Va.	Pocahontas	
98.4	Durbin	W. Va.	Pocahontas	2724
100.9	Bartow	W. Va.	Pocahontas	2776
103.7	Winterburn	W. Va.	Pocahontas	2868

Nicholas, Fayette and Greenbrier Railroad, formerly Sewell Valley Railroad.

Miles from Meadow Creek.	STATIONS.	Elevation Feet.
0.0	Meadow Creek	1273
2.6	Beurytown Mine	....
2.7	Beurytown	1556
4.6	Claypool Mine	....
4.9	Claypool	1868
5.5	Tina	....
6.0	Naylor Switchback	....
6.5	Dilly Siding	....
7.3	Camp Seven Switchback	2325
7.3	Meadow Creek Switchback	....
8.5	Meadow Bridge	2420
8.6	Meadow Bridge Mine	....
8.7	Hawley	2435
8.8	Hawley Mine Siding	....
10.6	Arthurs	2615
11.7	Teays Siding	....
11.8	Springdale	2770
11.9	Lowerys Siding	....
13.9	Youngs	2675
16.2	Bellwood	2505
16.3	Wilt Siding	....
16.4	Griffith Siding	....
16.5	Sevy	2465
17.6	Sims	2419
19.7	Rainelle	2419
20.1	Rainelle Junction	2395
21.9	Dwyer	2395
22.0	Green Siding	....
24.7	Surbaugh	2368
27.6	Honeydew	2325
28.0	Cruickshanks Farm	....
28.7	Crusher Siding	....
30.6	Burdette Creek	2268
....	Dry Creek	1976
37.0	Russellville	1904
40.0	Nallen	1892

The above levels on the Sewell Valley Railroad were sent the Survey by T. W. Raine, President, under date of September 30, 1918.

UNITED STATES GEOLOGICAL SURVEY LEVELS.

The various topographic quadrangles (Alderson, Callaghan, Clintonville, Lobelia, Marlinton, Meadow Creek, Richwood, Ronceverte, Warm Springs, Webster Springs, White

Sulphur Springs, and Winona which make up the area of Greenbrier County have been covered with a network of primary spirit-levels run by the United States Geological Survey, with financial cooperation from the West Virginia Geological Survey.

The following descriptive remarks are quoted from Bulletin No. 632 of the United States Geological Survey, pages 5-7; 1916:

"**Classification.** The elevations are classified as precise or primary, according to the methods employed in their determination. The former are determined by lines of levels run either in both forward and backward directions or by simultaneous double-rodded lines, a high-grade instrument being used and special precautions being taken in observations and reduction to correct errors and make the line continuously good throughout. The latter or primary levels are determined with the Y level, precautions being taken against only the principal errors and the levels being run mostly in circuits of single lines. The allowable limit of error observed on the precise work already done by the Geological Survey in this State is represented in feet by 0.02 times the square root of D, and that for the primary work by 0.05 times the square root of D in which D is the length of the circuit in miles.

"**Bench Marks.**—The standard bench marks are of two forms. The first form is a circular bronze or aluminum tablet, 3½ inches in diameter and ¼ inch thick, having a 3-inch stem, which is cemented in a drill hole in solid rock in the wall of some public building, a bridge abutment, or other substantial masonry structure. The second form, used where masonry or rock is not available, consists of a hollow wrought-iron post 3½ inches in outer diameter and 4 feet in length. The bottom is spread out to a width of 10 inches in order to give a firm bearing on the earth. A bronze or aluminum cap is riveted upon the top of the post which is set about 3 feet in the ground. A third style of bench mark, with abbreviated lettering, is used for unimportant points. This consists of a special copper nail 1½ inches in length driven through a copper washer ⅞ inch in diameter. The tablets as well as the caps on the iron posts are appropriately lettered, and cooperation by States is indicated by the addition of the State name.

"The numbers stamped on the bench marks described in the following pages represent the elevations to the nearest foot as determined by the levelman. These numbers are stamped with $\frac{3}{16}$-inch steel disks on the tablets or post caps, to the left of the word 'Feet.' The datum may so change some of the figures that the original markings are 1 to 2 feet in error. It is assumed that engineers and others who have occasion to use the bench-mark elevations will apply to the Director of the United States Geological Survey, at Washington, D. C., for the adjusted values, and will use the markings as identification numbers only.

"**Datum.**—All elevations determined by the United States Geological Survey and United States Coast and Geodetic Survey are referred

to mean sea-level, which is the level that the sea would assume if the influence of winds and tides were eliminated. This level is not the elevation determined from the mean of the highest and the lowest tides, nor is it the half sum of the mean of all the high tides and the mean of all the low tides, which is called the half-tide level. **Mean sea-level is the average height of the water, all stages of the tide being considered.** It is determined from observations made by means of tidal gages placed at stations where local conditions, such as long narrow bays, rivers, and like features, will not affect the height of the water. To obtain even approximately correct results these observations must extend over at least one lunar mouth, and if accuracy is desired they must extend over several years. At ocean stations the half-tide level and the mean sea-level usually differ but little. It is assumed that there is no difference between the mean sea-levels determined from observations in the Atlantic Ocean, the Gulf of Mexico, and the Pacific Ocean.

"The connection with tidal stations for bench marks in certain areas that lie at some distance from the seacoast is still uncertain, and this fact is indicated by the addition of a letter or word to the right of the word 'Datum' on tablets and posts. For such areas corrections for published results will be made from time to time as the precise-level lines of the United States Geological Survey, the United States Coast and Geodetic Survey, or other Government organizations are extended."

The primary levels by the United States Geological Survey, run in cooperation with the West Virginia Geological Survey, taken in part from Bulletin No. 632 of the United States Geological Survey, but mainly from unpublished data supplied by the Director of the latter Survey, are given below. The levels are given by topographic quadrangles and cover the area of Greenbrier included in the various sheets as also a small portion of the adjoining counties shown thereon. Mileages mentioned in the descriptions of bench marks are road mileages and are not air-line distances from the towns and post-offices mentioned to the points where the levels were taken.

ALDERSON QUADRANGLE: GREENBRIER, MONROE, AND SUMMERS COUNTIES.

(Latitude 37° 30′-37° 45′; Longitude 80° 30′-80° 45′)

Primary leveling by F. L. Shalibo in 1920:

From Clintonville Quadrangle south along Highways to Alderson.

	Feet.
Alderson, 2.2 miles northwest of, near small stream crossing, on east edge of road, in fence line, in large boulder; bronze tablet stamped "W. Va. 1920 1,608"........................	1,608.016

	Feet.
Alderson, 1.5 miles northwest of, at junction of Keeney's Knob road and River road, in northeast corner of, in ledge of rock; chiseled square, painted "1,537.5"............	1,537.30
Alderson, 0.9 mile northwest of, on River road at southeast corner of iron bridge, on large boulder; chiseled square, painted "1,554.9"..	1,554.68
Alderson, in northwest corner of front face of **Merchant Grocery Company building**; aluminum tablet, stamped "1,556" (B. 632, p. 10)..	1,555.074

From McGlone P. O., Ronceverte Quadrangle, west along highways to Willow Bend near southeast corner of Quadrangle.

McGlone P. O., 1.3 miles southwest of, 1.9 miles east of **Willow Bend**, in north corner of triangle at ╥-road, in large boulder; chiseled square, painted "2,061.0"..............	2,060.82
Willow Bend, 0.7 mile east of, on south edge of road, in front of farm house, in ledge of rock; chiseled square, painted "1,962.2"..	1,965.03

CALLAGHAN QUADRANGLE: GREENBRIER COUNTY.

(Latitude 37° 45′-38° 00′; Longitude 80° 00′-80° 15′).

Third order leveling by C. F. Shalibo in 1920:

From point 6.4 miles northeast of White Sulphur Springs, White Sulphur Springs Quadrangle, northeast along White Sulphur and Huntersville Railroad to Alvon, thence northwest and north into point in Marlinton Quadrangle, 2.90 miles north of Sue P. O.

White Sulphur Springs, 6.4 miles northeast of, on White Sulphur and Huntersville Railroad, at road crossing of ╥-road east from main road, in wooden support of cattle-guard; copper nail, painted "2,079.2"......................................	2,079.06
White Sulphur Springs, 7.4 miles northeast of, on White Sulphur and Huntersville Railroad, 20 feet south of road crossing, 200 feet southeast of house, in wooden support of switch; copper nail, painted "2,151.6"................................	2,151.49
Alvon, 3.0 miles southwest of, on White Sulphur and Huntersville Railroad, in northeast corner of railroad bridge over small stream, 250 feet northwest of house, in wooden support; copper nail, painted "2,054.9"....................................	2,054.76
Alvon, 2.0 miles southwest of, on White Sulphur and Huntersville Railroad, 15 feet west of track, 30 feet north of cattle-guard, 300 feet southeast of house, in top of cement post; bronze tablet stamped "W. Va. 1920-2,006"	2,006.067

	Feet.
Alvon, 0.8 mile southwest of, on White Sulphur and Huntersville Railroad, at **Wiley's crossing**, 100 feet east of garage, in timber to switch; copper nail, painted "1,961.0"	1,960.78
Alvon, 180 feet north of station, in southwest corner of large bridge over Anthony Creek; iron bolthead, painted "1,945.6"	1,945.46
Alvon, 0.9 mile northwest of, on road to Sue P. O., in northeast corner of guard-rail of large bridge over Anthony Creek; bronze tablet stamped "W. Va.-1920-1,938"	1,937.831
Alvon, 2.0 miles northwest of, on road to Sue P. O., 400 feet north of farm house, in wooden support to bridge over drain; copper nail, painted "1,985.2"	1,985.01
Sue P. O., 0.7 mile south of, 20 feet east of road, in root of large oak tree; copper nail, painted "1,990.3"	1,990.10
Sue P. O., 0.2 mile north of, at junction of road to post-office and county road, 50 feet south of forks, 10 feet west of fence in large rock; bronze tablet stamped "W. Va.-1920-2,026"	2,025.484
Sue P. O., 1.0 mile north of, on Little Creek road, 50 feet west of barn, on west edge of road, 10 feet from rail fence, in top of old stump; copper nail, painted "2,065.4"	2,065.20
Sue P. O., 2.1 miles north of, on Little Creek road, at road forks, at ╥-road west over Slab Camp Mountain, in southwest corner of fork, in root of tree; copper nail, painted "2.121.2"	2,120.92
Sue P. O., 2.9 miles north of, on Little Creek road, 70 feet south of road to sawmill, 10 feet east of road, in large rock; bronze tablet stamped "W. Va.-1920-2,206"	2,205.758

From Alvon west along highways into White Sulphur Springs Quadrangle.

Alvon, 1.7 miles west of, on west edge of sharp turn in road; 25 feet south of gate, on top of rock outcrop; chiseled square, fence-post is marked "T. B. M. 2,020.6"	2,020.50

Third order leveling by E. E. Harris in 1921:

From Alvon northeast along White Sulphur and Huntersville Railroad to Columbia Sulphur Springs.

Alvon, 180 feet north of station, in southwest corner of large bridge over Anthony Creek; iron bolthead	1,945.46
Alvon, 0.6 mile northeast of, in southwest corner of railroad trestle; copper nail and washer, tie marked "T. B. M. 1,946"	1,945.96

	Feet.
Alvon, 1.4 miles northeast of, south of track and on west side of second-class road crossing, in end of long railroad tie; copper nail and washer, crossing signal marked "T. B. M. 1,961.3"	1,961.22
Alvon, 2.1 miles northeast of, at crossing of railroad and dirt road known as **Kings crossing**, 35 feet north by 30 west of, in pasture, 2 feet west of fence line, in top of rock in place; bronze tablet stamped "H-10-1921 W. Va.-1965"	1,965.491
Witness bench mark, 63.4 feet east of, in southwest corner of cattle-guard; top of iron bolt	1,966.82
Alvon, 3.0 miles northeast of, 3.0 miles southwest of **Neola**, at crossing of Montgomery Creek, at south end of trestle between tracks; copper nail and washer, marked "T. B. M. 1,980.7"	1,980.65
Neola, 2.8 miles southwest of, 60 feet west of road crossing between track and Anthony Creek, on top of large oak stump; copper nail and washer, marked "T. B. M. 1,990.6"	1,990.68
Neola, 1.2 miles southwest of, west of track and 35 feet north of farm road crossing, in base of telephone-pole; rail spike, marked "T. B. M. 2,009.8"	2,009.84
Neola, in west face of store building owned by **Huntley Lumber Company** occupied by **J. D. Hoge**, in concrete foundation, 30.8 feet from south end, 49.3 feet from north end of building, 1.7 feet above ground, 1 foot below frame work; bronze tablet stamped "H-11-1921 W. Va. 2035"	2,034.785
Witness bench mark, 42 feet S. 70° W., in north root of 6-inch pine tree; copper nail and washer	2,032.81
Neola, 0.79 mile northeast of, in northeast corner of railroad trestle over Anthony Creek, in end of stringer; copper nail and washer, marked "T. B. M. 2,044.6"	2,044.61
Neola, 1.8 miles northeast of, 2.4 miles southwest of **Columbia Sulphur Springs**, at crossing of railroad and dirt road, 50 feet east of crossing, at west end of trestle, in end of round stringer; copper nail and washer, marked "T. B. M. 2,068.3"	2,068.21
Columbia Sulphur Springs, 1.4 miles southwest of, at south end of cattle-guard, on stringer between rails; copper nail and washer, marked "T. B. M. 2,089.2"	2,089.19
Columbia Sulphur Springs, 0.3 mile south of, in northeast corner of lane crossing, in root of apple tree; copper nail and washer, marked "T. B. M. 2.118.5"	2,118.42

Note: Two bench marks omitted here are on Marlinton Quadrangle.

CLINTONVILLE QUADRANGLE: GREENBRIER AND SUMMERS COUNTIES.

(Latitude 37° 45′-38° 00′; Longitude 80° 30′-80° 45′).

Third order leveling by F. L. Shalibo in 1920:

From near Fort Spring (Alderson Quadrangle), north along highways to near Alta, thence northwest to Meadow Bluff, thence south and west to Dawson, thence south and southeast to near Alderson (Alderson Quadrangle).

	Feet.
Fort Spring, 0.9 mile north of, at junction of Davis Creek and Greenbrier River, at right-angle turn in road, on north edge of road, in root of 4-foot oak tree; copper nail, painted "1,602.5"	1,602.52
Fort Spring, 1.5 miles north of, on northwest edge of road, opposite forks at top of hill, in ledge of road, 4 feet west of walnut tree; chiseled square, painted "1,798.9"	1,798.87
Fort Spring, 1.9 miles north of, 0.4 mile west of, top of hill, in northeast corner of T-road north, in large boulder; bronze tablet stamped "W. Va.-1920-1,788"	1,788.373
Fort Spring, 2.8 miles north of, on Davis Hollow road, 0.9 north of road forks, on west edge of road, on large boulder; chiseled square, painted "1,998.1"	1,998.11
Fort Spring, 3.6 miles north of, on Davis Hollow road, 0.6 mile southeast of Fort Spring turnpike, near small stream crossing, on west edge of road, on large boulder; chiseled square, painted "2,273.3"	2,273.28
Fort Spring, 4.2 miles north of, at junction of Davis Hollow road and Fort Spring turnpike, 100 feet southeast of road forks, in large boulder; bronze tablet stamped "W. Va.-1920-2,460"	2,459.955
Fort Spring, 5.2 miles north of, on Fort Spring turnpike, 15 feet northeast of **Jones Chapel,** in root of 20-inch oak tree; copper nail, painted "2,587.9"	2,587.89
Jones Chapel, 0.8 mile northeast of, on Fort Spring turnpike, opposite private road northwest, on south edge of road, in ledge of rock; chiseled square, painted "2,499.7"	2,499.69
Jones Chapel, 1.7 miles northeast of, on Fort Spring turnpike, 200 feet south of house, 150 feet north of T-road northwest, on west edge of road, in fence line, in top of old stump; copper nail painted "2,620.5"	2,620.53
Asbury, 3.0 miles east of, about 5.0 miles west of **Lewisburg,** on Blue Sulphur turnpike, at top of hill, 100 feet west of T-road south, on south edge of road, in ledge of rock; bronze tablet stamped "W. Va.-1920-2,583"	2,583.106

	Feet.
Asbury, 2.1 miles east of, on Blue Sulphur turnpike, in northeast corner of ╖-road north, in root of 10-inch maple tree; copper nail, painted "2,516.8"..	2,516.83
Asbury, 1.3 miles east of, on Blue Sulphur turnpike, in front of farm house, on north edge of road, in step of stile; copper nail, painted "2,197.4"..	2,197.43
Asbury, 150 feet west of ╖-road, in front of dwelling, on north side of road, in end of cement walk; bronze tablet stamped "W. Va.-1920-2,107"..	2,107.166
Asbury, 0.7 mile north of, in northwest corner of ╖-road northwest, near corner of old shed, in root of 10-inch hickory tree; copper nail, painted "2,191.0"........................	2,191.04
Asbury, 1.8 miles north of, 1.9 miles south of **Alta**, in northeast corner of second-class ╖-road east, at north end of gate, in root of 8-inch oak tree; copper nail, painted "2,365.5"	2,365.60
Asbury, 2.7 miles north of, 1.0 mile south of **Alta**, in northeast corner of school, in stone foundation; bronze tablet stamped "W. Va.-1920-2,462"..	2,461.831
Asbury, 3.7 miles north of, 4.3 miles east of **Clintonville**, at **Alta**, in southeast corner of road forks, in root of large oak tree; copper nail, painted "2,477.7"............................	2,477.78
Clintonville, 3.7 miles east of, 0.6 mile west of **Alta**, in northeast corner of ╖-road north, 30 feet east of pike, in ledge of rock; bronze tablet stamped "W. Va.-1920-2,291"	2,290.685
Clintonville, 2.5 miles east of, 1.8 miles west of **Alta**, 60 feet east of ╖-road south, at top of hill, on south edge of road, in ledge of rock; chiseled square, painted "2,350.7"	2,350.82
Clintonville, 1.4 miles east of, on north edge of road, opposite ╖-road south, 120 feet east of ╖-road north, in ledge of rock; chiseled square, painted "2,212.6"........................	2,212.70
Clintonville, opposite store, in southwest corner of foundation of **J. M. Ferrell's residence**; bronze tablet stamped "W. Va.-1920-2,648"	2,648.500
Clintonville, 0.9 mile west of, at top of hill, opposite ╖-road north, on south side of road, at east end of gate to field, in root of 20-inch oak tree; copper nail, painted "2,581.5"	2,581.63
Clintonville, 1.7 miles west of, 1.2 miles east of **Meadow Bluff**, in southwest corner of crossroads, in northeast corner of fence around **Sam Black's Memorial M. E. Church**, in top of corner post; copper nail, painted "2,425.0"	2,425.24
Meadow Bluff, opposite store, 100 feet south of road, in front of **James Osborne's residence**, in door-step; bronze tablet stamped "W. Va.-1920-2,461"..	2,460.890

	Feet.
Meadow Bluff, 0.8 mile south of, opposite **St. John's Church**, on west side of road, 1 foot west of fence, in large boulder; chiseled square, painted "2,546.6"	2,546.77
Meadow Bluff, 1.7 miles south of, 0.3 mile north of **Smoot P. O.**, opposite **Blue Sulphur Baptist Church**, in front of store, on west edge of road, in root of 10-inch oak tree; copper nail, painted "2,461.1"	2,461.27
Smoot P. O., in front of, on east edge of road, in large boulder; bronze tablet stamped "W. Va.-1920-2,477"	2,477.065
Smoot P. O., 1.0 mile west of, opposite old mill, in triangle of ┬-road north, in root of 10-inch oak tree; copper nail, painted "2,468.7"	2,468.86
Smoot P. O., 1.7 miles west of, 2.4 miles northeast of **Dawson**, 40 feet southwest of ┬-road, on fence line, on south edge of, in old telephone-pole; copper nail, painted "2,508.0"	2,508.11
Smoot P. O., 2.4 miles west of, 1.7 miles northwest of **Dawson**, in front of **S. D. McClung's residence**, 15 feet north of road, 3 feet north of fence, in root of 14-inch apple tree; copper nail, painted "2,451.9"	2,452.01
Smoot P. O., 3.3 miles west of, 0.8 mile north of **Dawson**, on west edge of road at three corners, in root of 4-foot oak tree; copper nail, painted "2,432.8"	2,432.90
Dawson, 200 feet south of corners, opposite store, in base of chimney, on west side of **J. F. Cooke's residence**; bronze tablet stamped "W. Va.-1920-2,432"	2,430.525
Dawson, 1.3 miles southeast of, in southwest corner of ┬-road south, 300 feet west of **Knapp School**, in root of 16-inch oak tree; copper nail, painted "2,443.6"	2,443.71
Dawson, 2.2 miles south of, 1.1 miles north of **Grassy Meadow**, at sharp angle on west edge of road near gate to farm house, in rail fence corner, on small stone; chiseled square, painted "2,442.9"	2,443.00
Grassy Meadow, back of **J. E. Leaf's residence**, in southeast corner of cellar wall; bronze tablet stamped "W. Va.-1920-2,449"	2,449.531
Grassy Meadow, 1.2 miles southeast of, at three corners, on east edge of road, in large boulder; chiseled square, painted "2,459.3"	2,459.29
Grassy Meadow, 2.6 miles south of, at sharp bend, 50 feet south of wooden bridge, in boulder; chiseled square, marked "2,306.4"	2,306.43
Snake Run School, 250 feet north of, at southeast corner of ledge of rock; bronze tablet stamped "W. Va.-1920-2,010"	2,010.273

	Feet.
Snake Run School, 0.9 mile south of, on "Keeney's Knob" road, on west edge of road, in large boulder; chiseled square, painted "2,277.5"	2,277.41
Snake Run School, 2.0 miles southwest of, on "Keeney's Knob" road, 25 feet southeast of schoolhouse, in root of large tree; copper nail, painted "2,701.8"	2,701.74
Alderson, 5.6 miles northwest of, near top of "Keeney's Knob," in stone chimney, on south side of Stevenson's residence; bronze tablet stamped "W. Va.-1920-2,817"	2,816.877
Alderson, 4.8 miles northwest of, on Keeney's Knob" road, 0.8 mile south of top, on east edge of road, in ledge of rock; chiseled square, painted "2,489.2"	2,489.08
Alderson, 3.9 miles north of, on "Keeney's Knob" road, in triangle at three corners, in root of large oak tree; copper nail, painted "2,036.8"	2,036.68

Third order leveling by F. L. Shalibo in 1920:

From Meadow Bluff northwest along highways by way of Rupert to point 3.1 miles east of Rainelle (Meadow Creek Quadrangle).

(An adjustment of 0.4 foot was made in this line.)

Meadow Bluff, 1.1 miles west of, on Kanawha turnpike, in southeast corner of ╦-road south, in root of small tree; copper nail, painted "2,530.3"	2,530.54
Meadow Bluff, 1.4 miles west of, in center of forks of ╦-road northwest, on top of fence-post; copper nail, painted "2,412.7"	2,412.92
Meadow Bluff, 2.6 miles west of, on Kanawha turnpike opposite ╦-road north, 30 feet south of road, in field, in large boulder; bronze tablet stamped "W. Va.-1920-2,467"	2,466.893
Reference T. B. M., 60 feet S. 30° E. of tablet	2,462.34
Meadow Bluff, 3.6 miles northwest of, 3.9 miles south of Rupert, 150 feet east of mountain cabin, on north edge of road, in large rock; chiseled square, painted "2,523.4"	2,523.64
Rupert, 2.7 miles south of, at top of mountain, 300 feet east of farm house, on north edge of road, in root of large tree; copper nail, painted "2,760.7"	2,761.09
Rupert, 2.0 miles south of, opposite ╦-road east, on west edge of road, in fence line, on large rock; chiseled square, painted "2,428.7"	2,428.99
Rupert, 0.8 mile south of, in southwest corner of road forks, 10 feet west of fence, in root of large oak tree; copper nail, painted "2,432.1"	2,432.37

	Feet.
Rupert, at southeast corner of post-office building, in stone foundation; bronze tablet stamped "W. Va.-1920-2,436"....	2,436.248
Rupert, 0.9 mile northwest of, at railroad camp No. 4, 50 feet northwest of small building, in root of large tree; copper nail, painted "2,429.4"........	2,429.72
Rupert, 1.7 miles northwest of, 0.6 mile south of **Mill Creek**, on east edge of road, in fence line, in large rock; chiseled square, painted "2,416.4"........	2,416.66
Rupert, 2.3 miles northwest of, in center of east guard-rail of cement bridge over **Mill Creek**; bronze tablet stamped "W. Va.-1920-2,414"........	2,414.164
Reference T. B. M., 515 feet west of tablet, 30 feet south of road, top of rock; chiseled square........	2,409.94
Rupert, 3.4 miles northwest of, 0.8 mile south of Laurel Creek, on west edge of road, in root of large tree; copper nail, painted "2,396.4"........	2,396.74
Rainelle, 4.1 miles east of, on northeast corner of cement bridge over **Laurel Creek**; bronze tablet stamped "W. Va.-1920-2,401"	2,401.490
Rainelle, 3.1 miles east of, 1.0 mile west of Laurel Creek, on south edge of road, in root of large tree; copper nail, painted "2,394.6"........	2,394.96

From point 3.70 miles east of Clintonville, north along highways to Cornstalk (White Sulphur Springs Quadrangle).

Clintonville, 3.7 miles east of, 0.6 mile west of **Alta**, in northeast corner of ╦-road north, 30 feet east of pike, in ledge of rock; bronze tablet stamped "W. Va.-1920-2,291"........	2,290.685
Alta, 1.5 miles north of, on west edge of road, at south edge of gate, in root of large tree; copper nail, painted "2,210.8"	2,210.84
Alta, 2.5 miles north of, 4.1 miles south of **Cornstalk**, on southeast corner of covered bridge over **Sinking Creek**, in stone foundation; chiseled square, painted "2,062.3"....	2,062.36
Cornstalk, 3.5 miles south of, opposite ╦-road southwest, in front of **Sinking Creek Baptist Church**, at south end of stile, in rock; bronze tablet stamped "W. Va.-1920-2,120"	2,120.007
Cornstalk, 2.7 miles south of, in northeast corner of ╦-road east, near fence corner, in ledge of rock; chiseled square, painted "2,137.3"........	2,137.34
Cornstalk, 1.6 miles south of, at angle in road, 600 feet east of schoolhouse, opposite field gate, 1 foot west of fence line, in top of old stump; copper nail, painted "2,144.8"....	2,144.86

	Feet.
Cornstalk, 250 feet southwest of store, 130 feet west of road, 60 feet west of old barn, in large rock; bronze tablet stamped "2,160 W. Va. 1920"	2,160.427
Williamsburg, 2.3 miles south of, 0.7 mile north of **Cornstalk**, on southwest corner of wooden bridge, in support; copper nail, painted "2,250.4"	2,250.46
Williamsburg, 1.1 miles south of, on east edge of road, 1 foot east of fence, 230 feet north of field gate, on west edge of road, in root of large tree; copper nail, painted "2,184.4"	2,184.45

Third order leveling by H. P. Kilby in 1921:

From Rupert north along highway to Duo.

Rupert, 1.2 miles north of, 10 feet west of road, in fence corner, in front of two-story house, in root of 20-inch oak tree; copper nail, painted "2,424.3"	2,424.58
Rupert, 2.5 miles north of, at second-class road forks running southeast, in top of boulder, at east edge of road; chiseled square, painted "2,441.9"	2,442.18
Reference T. B. M., for P. B. M., 18 feet west of P. B. M., top of rock; chiseled square	2,479.95
Rupert, 3.1 miles north of, 20 feet west of road, in top of large boulder, at edge of small creek; bronze tablet stamped "W. Va.-1921-K-1-Elev."	2,481.813

LOBELIA QUADRANGLE: GREENBRIER COUNTY.

(Latitude 38° 00′-38° 15′; Longitude 80° 15′-80° 30′.)

Third order leveling by C. F. Shalibo in 1920:

From Marlinton Quadrangle near Locust P. O. southwest along Chesapeake and Ohio Railroad to point 2.10 miles northeast of Renick, White Sulphur Springs Quadrangle.

(B. M. omitted here was transferred to Marlinton Quadrangle list.)

Locust P. O., 4.1 miles southwest of, on Chesapeake and Ohio Railroad, 100 feet northeast of **Droop Mountain Station**, on north side of track, in large boulder; bronze tablet stamped "W. Va-1920-1,948"	1,947.867
Locust P. O., 5.4 miles southwest of, on Chesapeake and Ohio Railroad, at **Rorer Station**, 0.1 mile south of tunnel, 60 feet northeast of station, in base of post; iron spike, painted "1,935.1"	1,934.71
Renick, 4.7 miles northeast of, on Chesapeake and Ohio Railroad, 170 feet southwest of **Horrock Station**, at southeast corner of bridge No. 296, in stone coping; chiseled square, painted "1,916.7"	1,916.28

	Feet.
Renick, 3.3 miles northeast of, on Chesapeake and Ohio Railroad, 100 feet northwest of **Golden Station,** 30 feet west of track, in large boulder; bronze tablet stamped "W. Va.-1920-1,899"........	1,898.092
Renick, 2.1 miles northeast of, on Chesapeake and Ohio Railroad, 80 feet southeast of mile-post No. 27, 30 feet east of track, in base of telephone-pole; iron spike, painted "1,886.0"	1,885.56

Third order leveling by E. E. Harris in 1921:

From point northeast of Williamsburg in White Sulphur Springs Quadrangle along highways northeast to Friars Hill thence southeast to Renick.

Williamsburg, 3.3 miles north of, 2 miles southwest of **Friars Hill,** on west edge of road, 60 feet south of crossroads, in east root of 15-inch jack oak tree; copper nail and washer, tree blazed and marked "T. B. M. 2,189.6"........	2,189.61
Friars Hill, 1.1 miles southwest of, on inside of angle in road, 3 feet east of box culvert, on rock boulder; chiseled square, marked "T. B. M. 2,241.9"........	2,241.17
Friars Hill, in southwest corner of road forks, in top of rock in place; bronze tablet stamped "2352-H-7-1921-W. Va."	2,351.865
Witness bench mark, 36.7 feet N. 65° E., in forks of road, in north root of 18-inch oak tree; copper nail and washer	2,348.90
Friars Hill, 0.8 mile east of, on west edge of road south, opposite forks of road east, in root of 10-inch hickory tree; copper nail and washer, tree blazed and marked "T. B. M. 2,342.8"........	2,342.82
Friars Hill, 1.5 miles east of, on south edge of road, 30 feet east of lane through gate to farm house of **J. E. Shafe,** on top of rock outcrop; chiseled square, fence railing marked "T. B. M. 2,368.3"........	2,368.34
Friars Hill, 3.5 miles east of, 4.8 miles west of **Renick,** at road forks, in southeast corner in top of rock in place; bronze tablet stamped "H-8-1921-W. Va. Elev.-1936"........	1,935.987
Witness bench mark, 43 feet S. 80° W., on northwest corner of large flat boulder........	1,937.93
Renick, 3.9 miles northwest of, on east side of road, about 150 feet north of ford over **Spring Creek,** in top of tall stump; copper nail and washer, marked "U. S. B. M. 1,918.9"	1,918.99

Third order leveling by H. P. Kilby, J. L. Lenovitz, and H. R. Kilmer in 1921:

Feet.

From Trout P. O. north along highway to Manning Knob.

Trout P. O., at road forks, in Y, top of boulder; chiseled square, painted "2,273.8" 2,273.71

Trout P. O., 1.2 miles north of, at west edge of road, point of ledge; bronze tablet stamped "2522 K-6-W. Va.-1921" 2,521.579

Reference mark, 55 feet south of P. B. M., 110 feet west of Little Roaring Creek, top of rock; chiseled square 2,514.20

Trout, 2.3 miles north of, at point of curve on slope of hill, top of rock at east edge of road; chiseled square, painted "2,928.8" 2,928.56

Trout, 3.5 miles north of, outcrop of ledge, at west edge of road; chiseled square, painted "3,499.0" 3,498.46

Trout, 4.2 miles north of, 40 feet west of road, top of large boulder, 3 feet above ground, on sharp curve in road, 30 feet west of fence corner; bronze tablet stamped "3827-K-7-1921" 3,827.073

Reference T. B. M., N. 50° E. 41.6 feet from P. B. M.; chiseled square on rock 3,827.61

Trout, 5.3 miles north of, 240 feet north of road to top of mountain, at west edge of road, on boulder; chiseled square, painted "4,085.7" 4,084.73

Richwood, about 12.75 miles southeast of, southwest of Greenbrier road, 795 feet northwest of road to Duo, in rock; aluminum tablet stamped "W. Va.-1921-K-Elev. 4117" (set in 1921 0.512 foot above center of hole at site of old tablet, described in Bulletin 632, p. 58) 4,117.455

Richwood, about 12.75 miles southeast of, southwest of Greenbrier road, 795 feet northwest of road to Duo, in rock; hole drilled horizontally in vertical face of rock, formerly occupied by tablet (Bull. 632, p. 58) 4,116.943

Reference T. B. M., directly under P. B. M., in point of rock; chiseled square 4,116.70

Richwood, 12.8 miles south of, at west edge of road, on rock; chiseled square, painted "3,873.6" 3,872.69

Richwood, 12 miles south, of, at second-class road forks west, top of large boulder, 30 feet west of road; bronze tablet stamped "W. Va.-K-8-1921-Elev. 3954" 3,953.566

Reference mark, 17.5 feet south of P. B. M., on rock; chiseled square 3,951.84

Richwood, 10.9 miles south of, at top of mountain, 10 feet west of road, in top of large rock; chiseled square, painted "3,966.6" 3,965.68

	Feet.
Richwood, 9.6 miles south of, at old camping ground, in root of 30-inch sugar maple tree, 15 feet east of road; copper nail and washer, painted "3,831.6"	3,830.70
Richwood, 9.0 miles south of, on north slope of hill, 15 feet north of Greenbrier road, in top of large boulder; bronze tablet stamped "3843 K-9-1921-W. Va."	3,843.280
Reference mark, 25 feet east of P. B. M., on rock; chiseled square	3,843.88

Note: P. B. M. Elev. 3,710.922 ft. which should come between these two B. M.'s has been completely destroyed. (B. 632, p. 58.)

Richwood, 7.9 miles south of, point of ledge, at east edge of road; chiseled square, painted "3,678.3"	3,677.37
Richwood, 7.2 miles south of, at top of **Manning Knob,** in root of 20-inch oak stump, at west edge of road; copper nail painted "3,914.5"	3,913.55

Third order leveling by P. E. Davenport in 1922:

From near Richwood (Richwood Quadrangle) southeast along highways to Little Rocky Creek. Spur leveled twice.

Bridge over first creek at west end of, painted "2,336"	2,336.1
Richwood, 3.52 miles southeast of, 30 feet N. 30° E. of center of road, 43 feet west of **Mr. Cunningham's house,** in large sandstone boulder; bronze tablet stamped "W. Va.-D-Elev. 2360", rock painted "U. S. 2.360.3 B. M."	2,360.260
Witness mark, 57 feet south of P. B. M., 27 feet southwest of center of road; chiseled square on sandstone boulder	2,358.26

Third order leveling by P. E. Davenport in 1922:

In front of large boulder, painted "2,413"	2,412.9
Richwood, 4.67 miles southeast of, 1.15 miles east of **Mr. Cunningham's house,** on north bank of Cherry River, on sandstone rock painted "U. S. 2,442.7 B. M."; chiseled square	2,442.59
On west bank of creek, painted "2,464"	2,464.6
At fence across old grade, painted "2,483"	2,483.0
Richwood, 5.73 miles southeast of, 15 feet east of bank of river on east margin of old railroad grade, on sandstone boulder, painted "U. S. 2,502.8 B. M."; chiseled square	2,502.65
Witness mark, in sandstone rock, 60 feet east of B. M., on north bank of river; chiseled square	2,536.5

	Feet.
Richwood, 6.31 miles southeast of, 15 feet north of bank of Cherry River, on north margin of old railroad grade, in sandstone boulder; bronze tablet stamped "2535," painted "U. S. 2,535.2 B. M."	2,535.038
Gate to farm house, painted "2,546"	2,545.6
Richwood, 7.38 miles southeast of, 450 feet west of abandoned house, on south side of old railroad grade, in sandstone rock; chiseled square, painted "U. S. 2,592.7 B. M."	2,592.49
Richwood, 8.12 miles southeast of, 0.75 mile east of large abandoned house, in sandstone boulder, 30 feet north of old railroad grade; chiseled square, boulder painted "U. S. 2,657.1 B. M."	2,656.86
Witness mark, in sandstone rock, on east side of grade; chiseled square	2,717.45
Richwood, 8.74 miles southeast of, on west bank of river, 1.36 miles south of old abandoned house, in large sandstone boulder; bronze tablet stamped '2717," tree 15 feet south painted "U. S. 2,716.7 B. M."	2,716.419

From Marlinton Quadrangle along highways west to Lobelia thence south to Jacox thence west and south to point 3.5 miles east of Friars Hill.

Boggs Run School, 15 feet from southeast corner of school, in large boulder; bronze tablet stamped "2707 W. Va.-D," rock painted (erroneously) "U. S. 2,807.5 B. M."	2,707.264
Witness mark, Boggs Run School, 23 feet southwest of southwest corner of, 53 feet west of bronze tablet, in small rock; chiseled square	2,703.56
On bank of **Boggs Run** at curve in road	2,617.5
At gate, painted "2,504"	2,503.3
Boggs Run School, 1 mile east of, 15 feet north of center of road, 80 feet east of intersection of Two Creek, in sandstone rock; chiseled square, painted "U. S. 2,377.9 B. M."	2,377.70
In front of Stiles, in front of church, marked "2,330"	2,329.5
At gate, marked "2,313"	2,312.8
Sugar Grove School, 221 feet N. 40° W. of, 20 feet east of center of road, on west side of creek, in large sandstone rock; bronze tablet stamped "W. Va.-2226-D," rock marked with a white cross, barn painted "U. S. 2,226.2 B. M."	2,225.930
Witness bench mark, 102 feet south of tablet, in west root of maple tree; copper nail and washer	2,227.10
At gate, marked "2,215"	2,215.0

	Feet.
Sugar Grove School, 1.14 miles north of, in large boulder on west margin of road; chiseled square, rock painted "U. S. 2,173.2 B. M."	2,172.92
Sugar Grove School, 1.89 miles north of, 60 feet north of road fork, on large limestone boulder on east margin of road; chiseled square, painted "U. S. 2,123.6 B. M."	2,123.37
At corner of Boice store, painted "2,070"	2,069.8
At ╥-road north painted "2.060"	2,060.0
Sugar Grove School, 2.81 miles north of, at fork of Y-road, on west side, in sandstone rock; chiseled square, painted "U. S. 2,051.9 B. M."	2,051.69
Large white house, 300 feet east of, 350 feet north of road, in large limestone boulder, on side of hill, rock marked with an arrow, barn painted "U. S. 2,012.1 B. M."; bronze tablet stamped "2,012"	2,011.844
Witness bench mark, 28 feet northeast from tablet, in small limestone rock; chiseled square	2,009.45
Dry Run, 2.26 miles south of, bench mark in **Mr. Bearden's yard**, on limestone boulder, on east side of railroad; chiseled square, tie is marked "U. S. 1,983.5 B. M." with keel	1,983.23
At east end of trestle	1,971.8
At switch near camp	1,947.6
At west end of trestle	1,939.7
At road crossing	1,936.2

MARLINTON QUADRANGLE: GREENBRIER COUNTY.

(Latitude 38° 00′-38° 15′; Longitude 80° 00′-80° 15′.)

Third order leveling by C. F. Shalibo in 1920:

From point 4.60 miles north of Sue P. O., Callaghan Quadrangle, north and west along highways and Chesapeake and Ohio Railroad to point 1.90 miles southwest of Locust P. O., Lobelia Quadrangle.

Sue P. O., 4.6 miles north of, on Little Creek road, 50 feet north of small bridge over stream, 0.2 mile southeast of deserted farm house, 10 feet east of road, in root of large oak tree; copper nail, painted "2,334.3"	2,334.04
Sue P. O., 5.4 miles north of, on Little Creek road, 100 feet northwest of house, 10 feet south of road, in root of oak tree; copper nail, painted "2,463.1"	2,462.86

Feet.

Sue P. O., 7.0 miles northwest of, on old trail on Spice Run, 0.2 mile west of old **Colter place**, 15 feet south of road, in large rock; bronze tablet stamped "W. Va. 1920 2,334" 2,334.272

Locust P. O., 3.0 miles southeast of, on Spice Run along old trail, at old lumber camp site, 20 feet west of small building, on west edge of trail in root of tree; copper nail, painted "2,220.6"........ 2,220.32

Locust P. O., 1.4 miles southeast of, on Spice Run, along old trail, 100 feet west of stream crossing, 0.5 mile east of Greenbrier River, on south edge of trail, in root of tree; copper nail, painted "2,030.0"........ 2,029.68

Locust P. O., 0.9 mile southwest of, on Chesapeake and Ohio Railroad, on east side of track, at small culvert over drain, in stone coping; bronze tablet stamped "W. Va. 1920 1,978" 1,975.559

Locust P. O., 0.32 mile southwest of, on Chesapeake and Ohio Railroad, 20 feet east of track, 50 feet northeast of mile-post No. 33, in base of telephone-pole; iron spike painted "1,958.1" (transferred from Lobelia Quadrangle)........ 1,957.70

From Warm Springs Quadrangle southwest along highway down Anthony Creek in southeast part of Quadrangle into Callaghan Quadrangle.

Trainer P. O., 2.96 miles northeast of, in southeast corner of cattle-guard, between rails of log railroad, in end of stringer; copper nail and washer, fence marked "U. S. 2,371.1 B. M."........ 2,371.47

Trainer P. O., 2.38 miles northeast of, 40 feet west of road center, on south bank of Anthony Creek, set in top of concrete post; bronze tablet stamped "2345 W. Va. 1921 H-172," corner fence-post marked "U. S. 2,345 B. M."...... 2,345.410

Reference mark, 92.8 feet east of tablet, on top of large boulder, at north end of foot-bridge over Anthony Creek; chiseled square........ 2,342.42

Trainer P. O., 1.32 miles northeast of, 50 feet north of road, on south bank of Anthony Creek, 20 feet west of fence line, in south root of 10-inch sycamore tree; copper nail and washer, tree marked "U. S. 2,293.1 B. M."........ 2,293.54

Trainer P. O., 0.17 mile northeast of, on west edge of road, 100 feet south of **May Chapel**, in south root of forked oak tree; copper nail and washer, tree marked "U. S. 2,254.1 B. M."........ 2,254.54

Trainer P. O., 0.64 mile southwest of, 35 feet north of road center, in front of home of **G. H. Rucker**, set in top of concrete post; bronze tablet stamped "2217 W. Va. 1921-H-173," fence-post marked "U. S. 2,217.1 B. M."........ 2,217.436

	Feet.
Reference mark, 40 feet south 25° east of tablet, in north root of 20-inch Columbia poplar tree; copper nail and washer	2,215.65
Trainer P. O., 1.48 miles southwest of, 30 feet northwest of roal, 50 feet south of forks of lane, 100 feet north of ford, in east root of tall stump; copper nail and washer, tree marked "U. S. 2,188.4 B. M."	2,188.76
Trainer P. O., 2.11 miles southwest of, in northeast corner of road forks, 20 feet north of log railroad, in south root of 15-inch pine tree; copper nail and washer, tree marked "U. S. 2,178.4 B. M."	2,178.72
Trainer P. O., 2.93 miles southwest of, 1 mile northeast of **Columbia Sulphur Springs**, in southeast corner of cattle-guard, in end of stringer between rails of lumber railroad; copper nail and washer, guard-rail marked "U. S. 2,146.3 B. M."	2,146.64
Columbia Sulphur Springs, north of Anthony Creek and 40 feet east of center of road crossing creek, 1 foot west of fence line, in top of boulder in place; bronze tablet stamped "2123 W. Va. 1921 H-12"	2,122.535
Witness bench mark, 36.4 feet south 80° west of tablet, in root of 12-inch pine tree; copper nail and washer	2,122.82

From Huntersville southwest along highways to near southwest corner of Quadrangle.

Burr School, 4.46 miles southwest of, 30 feet south of road center, 20 feet west of run, in west root of tall stump; copper nail and washer, stump marked "U. S. 2,445.9 B. M."	2,446.25

At Columbia Sulphur Springs (transferred from Callaghan Quadrangle.)

Columbia Sulphur Springs, north of Anthony Creek, 40 feet east of center of road crossing creek, 1 foot west of fence line, in top of rock in place; bronze tablet stamped "H-12-1921-W.Va.-2123"	2,122.535
Witness bench mark, 36.4 feet south 80° west of tablet, in root of 12-inch pine tree; copper nail and washer	2,122.82

MEADOW CREEK QUADRANGLE: GREENBRIER, FAYETTE, AND SUMMERS COUNTIES.

(Latitude 37° 45′-38° 00′; Longitude 89° 45′-81° 00′.)

Primary leveling by F. L. Shalibo in 1920:

From point 2.10 miles east of Rainelle in Clintonville Quadrangle, west along highways to Rainelle.

Rainelle, 3.1 miles northeast of, 1.0 mile southwest of Laurel Creek, on east edge of road, in root of large tree; copper nail and washer	2,394.96

	Feet.
Rainelle, 2.1 miles east of, on southeast end of cement bridge over Meadow River; chiseled square, painted "2,397.3"....	2,397.72
Rainelle, in west side of stoop of bank building; bronze tablet stamped "2,425 B 1912" (Bull. 632, p. 68)........	2,424.401
Reference B. M., S. 60° E. of tablet, in concrete sidewalk, at corner of store; chiseled square........	2,420.10

From Springdale north along highway to Riverside. (Line leveled twice.)

Springdale, 1.1 miles northwest of, 200 feet south of road crossing, 200 feet south of switch; chisel point on west end of north abutment, chiseled "2675 U. S."........	2,674.95
Springdale, 2.6 miles north of, 40 feet east of track; copper nail in base of 3-foot oak tree, scribed "2543 U. S."........	2,543.10
Springdale, 3.9 miles north of, east edge of track, chisel point on boulder, chiseled "2465 U. S."........	2,465.05
Sturgeon Branch, 200 feet east of station, south end of west abutment of railroad bridge; bronze tablet stamped "2420 B 1912"........	2,419.396
Sims, 40 feet north of station; chisel point on boulder, chiseled "2419 U. S."........	2,419.09
Rainelle, 1 mile west of, 40 feet west of track; copper nail in base of 2½-foot white-oak tree, scribed "2399 U. S."....	2,398.97
Rainelle, in west side of stoop of bank building, bronze tablet stamped "2425 B 1912"........	2,424.601
Rainelle, 1.6 miles northeast of, 40 feet north of track; copper nail in base of 1-foot oak tree, scribed "2393 U. S."........	2,392.49
Aldrich Camp, 3.3 miles northeast of **Rainelle,** 40 feet south of track, at point where river turns north, in large boulder; bronze tablet stamped "2395 B 1912"........	2,395.396

RICHWOOD QUADRANGLE: GREENBRIER AND NICHOLAS COUNTIES.

(Latitude 38° 00′-38° 15′; Longitude 80° 30′-80° 45′.)

Primary leveling by H. P. Kilby in 1921:

P. B. M.'s stamped by G. E. Sisson in 1924.

From point 4.1 miles east of Rainelle north along highway to point 8.8 miles southeast of Snow Hill.

Rainelle, 4.1 miles east of, on northeast corner of cement bridge over **Laurel Creek;** bronze tablet stamped "W. Va. 1920 2401"........	2,401.490

	Feet.
Reference mark, 20 feet east of tablet, in top of large rock, chiseled square	2,400.57
Laurel Creek Bridge, 0.9 mile north of, at east edge of road, top of large boulder; chiseled square, painted "2,607.1"	2,606.99
Laurel Creek Bridge, 2.1 miles north of, at top of hill, at second-class road forks, in northeast root or 40-inch chestnut tree, at east edge of road, on fence line; copper nail, painted "3,036.9"	3,036.68
Reference T. B. M., for P. B. M., 51 feet north 10° west, at edge of road, in large rock; chiseled square	2,946.27
McClung, at northwest corner of schoolhouse, in large boulder; bronze tablet stamped "W. Va. 1921 K-5-Elev. 2956"	2,955.862
McClung, 1.0 mile north of, top of large boulder, at west edge of road; chiseled square, painted "3,070.7"	3,070.63
Snow Hill, 8.8 miles southeast of, at northwest intersection of Nicholas road and road to **Nutterville,** 500 feet north of **Grig McClung's house,** in sandstone rock; bolt stamped "3393" (Bull. 632, p. 59)	3,393.356
Reference T. B. M., for P. B. M., 45 feet east of P. B. M., on large rock; chiseled square	3,399.00

From Rupert north along highway to Duo, thence to Lile.

Rupert, 3.1 miles north of, 20 feet west of road, in top of boulder, at edge of small creek; bronze tablet stamped "W. Va. 1921 K-1 2482"	2,481.813
Reference mark, for above is 18 feet west, top of rock; chiseled square	2,479.95
Rupert, 4.2 miles north of, top of large rock, at north edge of brook; chiseled square, painted "2,607.3"	2,607.52
Rupert, 5.2 miles north of, top of rock, at east edge of road; chiseled square, painted "2,644.4"	2,644.64
Reference T. B. M., for P. B. M., south 10° west of P. B. M. 60 feet, top of rock; chiseled square	2,724.46
Rupert, 6.0 miles north of, at west edge of road, 30 feet west of Clear Creek, top of boulder; bronze tablet stamped "W. Va. 1921 K-2 Elev. 2727"	2,726.718
Rupert, 7.2 miles north of, at entrance of brook into Clear Creek, top of flat rock, at west edge of road; chiseled square, painted "2,866.5"	2,866.72
Rupert, 8.2 miles north of, at bridge over creek, in north stone abutment, west end; chiseled square, painted "3,022"	3,022.23

	Feet.
Reference T. B. M., for P. B. M., 44 feet south of P. B. M., top of rock; chiseled square	3,184.04
Rupert, 8.9 miles north of, at deserted house in clearing, 30 feet west of road, 20 feet east of house, in 3 by 5-foot flat rock; bronze tablet stamped "W. Va. 1921 K-3 3187"	3,186.650
Rupert, 10.0 miles north of, about 1.0 mile south of **Duo**, top of flat rock, at east edge of road; chiseled square, painted "3,180.9"	3,181.11
Duo, 0.5 mile northwest of, 200 feet north of forks of road to Rupert, 100 feet north of branch, 50 feet east of road, near small house (house destroyed), in boulder; copper bolt stamped "3,208" (Bull. 632, p. 59)	3,208.259
Duo, 1.3 miles north of, in root of 40-inch oak tree, at east edge of road; copper nail, painted "3,343.5"	3,343.63
Reference T. B. M., for P. B. M., 56.5 feet south 10° east, top of rock; chiseled square	3,503.52
Duo, 1.8 miles north of, on slope of **Beech Knob**, at west side of road, in large boulder; bronze tablet stamped "1921 W. Va. K-4 Elev. 3509"	3,509.299
Duo, 2.5 miles north of, 2.5 miles south of **Lile**, top of large boulder at west edge of road; chiseled square, painted "3,829.9"	3,829.98
Duo, 3.3 miles north of, at east edge of road, shelf of ledge; chiseled square, painted "3,663.8"	3,663.94
Duo, 4.0 miles north of, 1.0 mile south of **Lile**, top of flat rock, at east edge of road; chiseled square, painted "3,359.9"	3,360.03
Lile, 100 feet north of McMillion Creek, 8 feet east of road, in rock, on fence line; copper bolt (This P. B. M. is described wrong in Bull. 632) "3123"	3,122.938
Reference T. B. M., for P. B. M., 45 feet north 20° west; chiseled square on top of rock	3,127.08

Primary leveling by H. P. Kilby, J. L. Lenovitz, and H. R. Kilmer in 1921:

From Manning Knob north along highway to Richwood (Double-run line.)

Richwood, 5.7 miles south of, at old sawmill site, in large boulder, 20 feet east of road, 150 feet north of creek; bronze tablet stamped "W. Va. 1921 K-10 Elev. 3650"	3,649.604
Reference T. B. M., 10 feet west of P. B. M.; chiseled square on rock	3,651.24

	Feet.
Richwood, 5.0 miles south of, top of rock at west edge of road, 6 feet east of stone wall at Rock Battery; chiseled square, painted "3,573.8"	3,572.90
Richwood, 3.9 miles south of, top of boulder at west edge of road, 60 feet west of **J. C. Babet's barn;** chiseled square, painted "3,366.8"	3,365.68
Richwood, 3.0 miles south of, in outcrop of ledge at west edge of road, 50 feet north of small creek; bronze tablet stamped "W. Va. 1921 K-12" (badly battered and loose)..	3,090.761
Reference T. B. M., north (?) 20° west 50 feet, top of boulder; chiseled square	3,094.40
Richwood, 2.0 miles south of, top of large rock, at west edge of road; chiseled square, painted "2,831.9"	2,830.99
Richwood, 0.9 mile south of, on west side of road, top of boulder; chiseled square, painted "2,513.8"	2,512.82
Richwood, 50 feet north of station, in outcrop; bronze tablet stamped "2,193" (Bull. 632)	2,194.121
Richwood, in post-office building, at entrance, in concrete foundation; bronze tablet stamped "K-11 1921 W. Va. Elev. 2213"	2,212.598

RONCEVERTE QUADRANGLE: GREENBRIER AND MONROE COUNTIES.

(Latitude 37° 30′-37° 45′; Longitude 80° 15′-80° 30′.)

Primary leveling by F. L. Shalibo in 1920:

From Ronceverte south along highways to Second Creek P. O. thence northeast along highways via Glace to Tuckahoe.

Ronceverte, in front face of **First National Bank Building;** aluminum stablet stamped "1,666" (B. 632, p. 10)	1,665.036
Ronceverte, 1.0 mile south of, on mountain road, opposite ╥-road west, 10 feet east of road, on bank, in root of small tree; copper nail, painted "1,851.8"	1,851.79
Ronceverte, 2.0 miles south of, on mountain road, in northwest corner of ╥-road west, in root of old stump; copper nail, painted "2,256.2"	2,256.18
Ronceverte, 2.7 miles south of, at road forks, at top of mountain, 20 feet northwest of forks, on north edge of road; bronze tablet stamped "W. Va. 1920 2,417"	2,416.758
Ronceverte, 3.5 miles south of, 0.6 mile east of **Organ Cave P. O.,** in northeast corner of crossroads, in root of large oak tree; copper nail, painted "2,246.4"	2,246.37

	Feet.
Organ Cave P. O., at northeast corner of post-office building, on top of stone hitching-post; chiseled square, painted "2,196.8"	2,196.78
Organ Cave P. O., 0.9 mile south of, on east edge of road, in front of farm house, near yard gate, in root of large oak tree; copper nail, painted "2,224.5"	2,224.48
Second Creek P. O., 2.8 miles north of, 60 feet north of road forks, on east edge of road, in large rock; bronze tablet stamped "W. Va. 1920 2,062"	2,061.718
Second Creek P. O., 1.6 miles north of, on northwest corner of cement bridge over **Second Creek**; chiseled square, painted "1,825.7"	1,825.65
Glace, 1.0 mile northeast of, at foot of hill, at ╥-road north, 20 feet east of road, near fence line, in root of old stump; copper nail, painted "2,517.0"	2,516.93
Glace, 2.1 mile northeast of, 20 feet north of road, in front of house, at fence line, in root of small maple tree; copper nail, painted "2,367.6"	2,367.52
Glace, 3.2 miles northeast of, 3.9 miles southwest of **Tuckahoe**, in front of house, 50 feet north of gate, along fence line, 30 feet west of road, in small rock; bronze tablet, stamped "W. Va. 1920 2,257"	2,256.990
Tuckahoe, 2.9 miles southwest of, 4.2 miles northwest of **Glace**, in front of house, on north edge of road, in root of tree; copper nail, painted "2,171.8"	2,171.71
Tuckahoe, 2.3 miles southwest of, 150 feet east of **Tuckahoe School**, 20 feet east of road, in creek bed, in root of small tree; copper nail, painted "2,126.3"	2,126.24
Tuckahoe, 1.3 miles southwest of, in front of store on north edge of road, along fence line, in root of old stump; copper nail, painted "2,078.4"	2,078.31
Tuckahoe, 500 feet northwest of station, on Chesapeake and Ohio Railroad, 30 feet south of track, in southwest corner-stone of arch, in coping; bronze tablet stamped "W. Va. 1920 2,024"	2,024.084

At Ronceverte.

Ronceverte, at northeast corner of concrete walk to Chesapeake and Ohio Railroad station, in angle of walk; chiseled square	1,666.03

WHITE SULPHUR SPRINGS QUADRANGLE: GREENBRIER COUNTY.

(Latitude 37° 45′-38° 00; Longitude 80° 15′-80° 30′.)

Third order leveling by F. L. Shalibo in 1920:

From Cornstalk north along highways to Williamsburg.

	Feet.
Williamsburg, in front cement step to Williamsburg Bank; bronze tablet stamped "W. Va.-1920-2,190"........................	2,190.117

From Dickson northeast along Chesapeake and Ohio Railroad to White Sulphur Springs, thence northeast along highways into Callaghan Quadrangle. (Note: B. M.'s omitted here are on Clintonville Quadrangle.)

Dickson, 0.33 mile west of, in top of abutment, at west end of bridge over highway; aluminum tablet stamped "1790" (Bull. 632, p. 10)...	1,789.207
White Sulphur Springs, 2.7 miles southwest of, on Chesapeake and Ohio Railroad, on south side of track, in southwest corner of semaphore No. 3141, in cement base; chiseled square, painted "1,854.8"............................	1,854.80
White Sulphur Springs, 1.4 miles southwest of, on Chesapeake and Ohio Railroad, on north edge of track, at southwest corner of semaphore No. 3140, in cement base; chiseled square, painted "1,887.1"............................	1,887.11
White Sulphur Springs, 540 feet north of station, at main entrance to Greenbrier Hotel grounds, in cement walk; aluminum tablet stamped "1915" (Bull. 632, p. 10) (An old tablet in new place. Church was torn down and hotel owner placed tablet here)..	1,916.616
White Sulphur Springs, at northeast end of Main Street, at railroad crossing of White Sulphur and Huntersville Railroad, 20 feet east of track, 60 feet east of store, in wooden support of switch; copper nail, painted, "1,850.7"	1,850.64
White Sulphur Springs, 1.0 mile northeast of, on White Sulphur and Huntersville Railroad, at northwest corner of railroad bridge over creek, in wooden abutment; copper nail, painted "1,870.3"...	1,870.21
White Sulphur Springs, 1.9 miles northeast of, on White Sulphur and Huntersville Railroad, 10 feet south of track, at switch, 600 feet west of road crossing, in boulder; bronze tablet stamped "W. Va.-1920-1915".......................	1,915.251
White Sulphur Springs, 2.9 miles northeast of, on White Sulphur and Huntersville Railroad, 70 feet north of road crossing, 100 feet northwest of house, in northwest corner of small railroad bridge, in wooden support; copper nail, painted "1,990.0"...	1,989.81

	Feet.
White Sulphur Springs, 4.1 miles northeast of, on White Sulphur and Huntersville Railroad, in wooden abutment of cattle-guard; copper nail, painted "2,018.0"	2,017.87
White Sulphur Springs, 4.9 miles northeast of, on White Sulphur and Huntersville Railroad, 60 feet east of track, at entrance to old ruins of house, in top of cement stile; bronze tablet stamped "W. Va.-1920-2,038"	2,038.295

From point 1.10 miles northeast of Renick, in Lobelia Quadrangle, south along Chesapeake and Ohio Railroad to Caldwell.

Renick, 1.1 miles northeast of, on Chesapeake and Ohio Railroad, 40 feet southeast of switch, 150 northeast of mile-post No. 26, 30 feet south of track, in telephone-pole; iron spike, painted "1,877.5"	1,877.02
Renick, in front of door-step of bank building; bronze tablet stamped "W. Va.-1920-1,901"	1,900.956
Renick, 1.3 miles south of, on Chesapeake and Ohio Railroad, 30 feet east of track, in base of telephone-pole; iron spike, painted "1,865.3"	1,864.84
Renick, 2.4 miles south of, on Chesapeake and Ohio Railroad, 20 feet west of track, 0.3 mile south of road crossing, 0.9 mile north of **Spring Creek,** on rock; chiseled square, painted "1,859.5"	1,859.02
Spring Creek, 500 feet north of station, at southeast corner of railroad bridge over **Spring Creek;** bronze tablet stamped "W. Va.-1920-1,855"	1,854.538
Spring Creek, 1.1 miles south of, on Chesapeake and Ohio Railroad, in timber of cattle-guard over track; copper nail, painted "1,849.3"	1,848.72
Spring Creek, 2.1 miles south of, on Chesapeake and Ohio Railroad, 1.6 miles northwest of **Gardner Station,** 40 feet east of track, in telephone-pole; iron spike, painted "1,841.1"	1,840.64
Gardner Station, 0.2 mile southwest of, on Chesapeake and Ohio Railroad, at southeast corner of bridge No. 191, over small creek, in stone coping; bronze tablet stamped "W. Va.-1920-1,839"	1,839.067
Gardner Station, 1.3 miles southwest of, on Chesapeake and Ohio Railroad, 60 feet southeast of mile-post No. 18, 40 feet east of track, in telephone-pole; iron spike, painted "[illegible]"	1,829.00

	Feet.
Woodman Station, 0.9 mile northeast of, on Chesapeake and Ohio Railroad, 170 feet south of mile-post No. 17, 30 feet east of track, in telephone-pole; iron spike, painted "1,823.2"	1,822.72
Woodman Station, on Chesapeake and Ohio Railroad, 30 feet northeast of station, 40 feet east of track, in large rock; bronze tablet stamped "W. Va.-1920-1,815"	1,814.501
Woodman Station, 1.1 miles west of, on Chesapeake and Ohio Railroad, 0.8 mile northeast of **Anthony Station**, 20 feet east of track, in base of mile-post No. 15; iron spike, painted "1,806.9"	1,806.49
Anthony Station, 60 feet northwest of, 30 feet west of track, in base of telephone-pole; iron spike, painted "1,799.8"	1,799.30
Anthony, 1.2 miles southwest of, on Chesapeake and Ohio Railroad, 0.7 mile southeast of mile-post No. 13, 10 feet west of track, in rock wall; bronze tablet stamped "W. Va.-1920-1,789"	1,788.260
Anthony, 2.3 miles southwest of, on Chesapeake and Ohio Railroad, 0.7 mile northeast of **Keister Station**, 100 feet east of house, 30 feet east of track, in telephone-pole; iron spike, painted "1,775.5"	1,775.05
Keister, 0.3 mile southwest of, on Chesapeake and Ohio Railroad, at south end of siding at **Keister**, in switch timber; copper nail, painted "1,767.0"	1,766.54
Brink Station, 1.7 miles southwest of **Keister**, on Chesapeake and Ohio Railroad, at southwest end of old siding, in switch timber; copper nail, painted "1,755.8"	1,755.33
Brink Station, 0.3 mile southwest of, 1.6 miles northeast of **Bowes Station**, on Chesapeake and Ohio Railroad, 300 feet southwest of mile-post No. 9, at private road crossing, in stone coping of culvert; bronze tablet stamped "W. Va.-1920-1,747"	1,746.312
Bowes Station, 0.3 mile northeast of, on Chesapeake and Ohio Railroad, 100 feet north of siding at railroad bridge No. 75, at southwest corner of stone coping; chiseled square, painted "1,739.5"	1,739.02
Bowes Station, 1.1 miles southwest of, on Chesapeake and Ohio Railroad, 0.6 mile northeast of **Hopper Station**, 20 feet west of track, 0.1 mile from sharp bend, in ledge of rock; chiseled square, painted "1,728.3"	1,727.84

	Feet.
Hopper Station, 150 feet opposite house, 10 feet west of track, in ledge of rock; bronze tablet stamped "W. Va.-1920-1,725"	1,724.955
Hopper Station, 1.1 miles southwest of, on Chesapeake and Ohio Railroad, 2.7 miles northeast of **North Caldwell Station,** on west side of track, at culvert, in stone foundation; chiseled square, painted "1,711.9"	1,711.46
North Caldwell Station, 1.7 miles north of, on Chesapeake and Ohio Railroad, 60 feet south of road crossing, 50 feet east of track, in old stump; copper nail, painted "1,704.4"	1,703.94
North Caldwell Station, 0.5 mile northeast of, on Chesapeake and Ohio Railroad, at northeast end of siding, 10 feet west of track, in timber of switch; iron bolt, painted "1,693.9"	1,693.39
North Caldwell Station, at south end of platform, 10 feet west of track, 50 feet north of macadam road, in cement coping of platform; bronze tablet stamped "W. Va.-1920-1,693"	1,693.087
Whitcomb, 1.0 mile, northeast of, on Chesapeake and Ohio Railroad, 0.8 mile southwest of **North Caldwell Station,** in top of mile-post No. 1; copper nail, painted "1,698.4"	1,697.93
Whitcomb, 500 feet east of, in top of north side of west abutment of bridge over river; aluminum tablet stamped "1,700" (B. 632, p. 10 value=1,699.570 feet not used). (Note: Local maintenance-of-way man says that this bridge was remodeled in 1908, therefore bench mark was changed)	1,699.903
Whitcomb Station, 1.3 miles northwest of, at semaphore 3192, in west corner of concrete base; chiseled square, painted "1,727.8"	1,727.35
Caldwell, 0.56 mile west of, in top of north side of west abutment of steel bridge; aluminum tablet stamped "1,745" (B. 632, p. 10)	1,744.562

From Tuckahoe north along Chesapeake and Ohio Railroad to point 2 miles northwest of.

Tuckahoe, 500 feet northwest of station, on Chesapeake and Ohio Railroad, 30 feet south of track, in southwest corner-stone of arch, in coping; bronze tablet stamped "W. Va.-1920-2,024"	2,024.090

	Feet.
Tuckahoe, 1.0 mile northwest of, on Chesapeake and Ohio Railroad, 5 feet west of track, in cement base of semaphore; chiseled square, painted "2,004.0"	2,003.89
Tuckahoe, 2.03 miles northwest of, 15 feet north of mile-post "Cin. 355," west of track, in face of wall, in rock cut; aluminum tablet stamped "1,981" (B. 632, p. 10)	1,980.335

Third order leveling by E. E. Harris in 1921:

From Whitcomb west along Chesapeake and Ohio Railroad to Ronceverte.

Whitcomb, 1.12 miles west of, near mile-post "Ft. M. 321," on north side of track, on rock ledge, at base of rocky cliff; chiseled square	1,697.06
Whitcomb, 2.2 miles west of, 0.86 mile east of **Ronceverte,** north side of track, in southwest corner of headwall of culvert; large chiseled square, culvert marked "T. B. M. 1,683.4"	1,683.45

From Ronceverte north along highways to Williamsburg.

Ronceverte, 1.4 miles north of, 3.3 miles south of **Lewisburg,** at crossing of L. & R. Electric Railway and concrete road, 7 feet west of track, 50 feet north of crossing, on top of large flat outcrop of rock; chiseled square, fence-post marked "T. B. M. 2,132.8"	2,132.73
Lewisburg, 2.7 miles south of, in forks of Y-road, inside fence line, in north root of 18-inch poplar tree; copper nail, fence-post marked "T. B. M. 2,185.5"	2,185.37
Lewisburg, 2.0 miles south of, on east edge of concrete road, 70 feet south of angle in road, in center of top of concrete culvert; chiseled square, fence-post marked "T. B. M. 2,144"	2,143.99
Lewisburg, 2.0 miles south of, 70 feet south of angle in road, in top of east end of culvert; bronze tablet stamped "H-O-1921-W. Va."	2,144.002
Witness bench mark, 35 feet north, in telephone-pole; spike, marked "2,144.549"	2,144.48
Lewisburg, 1.1 miles south of, on west edge of concrete road, 60 feet south of private lane west, on top in center of concrete culvert; chiseled square, fence-post marked "T. B. M. 2,206.6"	2,206.56
Lewisburg, at southeast corner of hotel, in west root of 18-inch poplar tree, on west edge of road; copper nail and washer	2,086.61

	Feet.
Lewisburg, on south side of entrance to court-house, in northwest corner of concrete foundation to supporting pillar; bronze tablet "H-1-1921-W. Va."	2,084.153
Witness bench mark, in northwest corner of walk at entrance to court house, 53 feet east by 30 feet north; chiseled square, marked "2,083.361"	2,083.30
Lewisburg, 0.8 mile north of, on east edge of road, 60 feet south of second-class road west, in west root of 18-inch oak tree, in fence line; copper nail and washer, tree blazed and marked "T. B. M. 2,197.7"	2,197.69
Lewisburg, 1.5 miles north of, on east edge of road, at right-angle turn in road to west, on top of rock ledge, chiseled square, ledge marked "T. B. M. 2,250.4"	2,250.33
Lewisburg, 1.5 miles north of, on south side of road in southwest corner of large stone step to residence of **J. W. Rader**; bronze tablet stamped "H-2-1921-W. Va."	2,259.967
Witness bench mark, 43.2 feet N. 40° E., in west root of 30-inch black walnut tree; copper nail and washer	2,260.50
Lewisburg, 2.4 miles north of, on east edge of road, 15 feet south of lane crossing, on top of rock outcrop; chiseled square, marked "T. B. M. 2,295.9"	2,295.83
Lewisburg, 3.3 miles north of, on east edge of road, 30 feet south of private lane east, on top of rock ledge; chiseled square marked "T. B. M. 2,291.3"	2,291.23
Lewisburg, 4.5 miles north of, 220 feet north of road forks, in southwest corner of stone step, at entrance to **Fairview Church**; bronze tablet stamped "H-3-1921-W. Va."	2,353.046
Witness bench mark, 38.8 feet S. 70° W. of tablet, in south root of 15-inch hickory tree; copper nail	2,350.52
Lewisburg, 5.3 miles north of, 0.8 mile north of **Fairview Church,** 70 feet east of road, 80 feet south of lane to residence of **J. W. White,** on top of rock outcrop; chiseled square, telephone-pole marked "T. B. M. 2,274.9"	2,274.84
Lewisburg, 6.2 miles north of, 5.0 miles south of **Unus,** on west edge of road, in gap, on top of rock ledge; chiseled square, marked "T. B. M. 2,376.8"	2,376.71
Unus, 3.9 miles south of, in northeast corner of ╥-road east, private lane west, on top of rock boulder; chiseled square, corner fence post marked "T. B. M. 2,143.1	2,143.13

	Feet.
Unus, 3.17 miles south of, on east edge of road, on south edge of lane through gate to pasture, in top of rock in place; bronce tablet stamped "H-4-1921-W. Va."	2,308.850
Witness bench mark, on west edge of road inside fence line, in root of 12-inch sugar tree; copper nail and washer	2,306.54
Unus, 2.2 miles south of, in forks of Y-road, in west root of 7-inch sugar tree; copper nail and washer, mail-box post marked "T. B. M. 2,410.2"	2,410.11
Unus, 1.5 miles south of, on east edge of road, 25 feet south of lane east through gate, in top of stump; copper nail and washer	2,385.67
Unus, 0.9 mile south of, 100 feet east of **Unus School,** in forks of road, in top of large stump; copper nail and washer, marked "T. B. M. 2,376.7"	2,376.63
Unus, on west side of road, 60 feet northwest of post-office, in top of large boulder; bronze tablet stamped "H-5-1921-W. Va	2,120.311
Witness mark, on east edge of road, 120 feet north of post-office, outside fence line, on top of boulder; chiseled square	2,126.70
Unus, 0.9 mile north of, on east edge of road, 70 feet north of private lane through gate, in west root of 24-inch white oak tree; copper nail and washer, tree blazed and marked "T. B. M. 2,360.8"	2,360.72
Unus, 1.6 miles north of, on south edge of road, in line with T-road northeast, in north root of 18-inch oak tree, copper nail and washer, tree blazed and marked "T. B. M. 2,430.9"	2,430.79
Unus, 2.2 miles north of, 2.6 miles south of **Williamsburg,** on west edge of road, 40 feet south of cross lane, on top of rock outcrop; chiseled square, fence rail marked "T. B. M. 2,211.6"	2,211.53
Williamsburg, 2.2 miles southeast of, on east edge of road, in line with south edge of road to northwest, on top of rock outcrop; chiseled square, rock marked "T. B. M. 2,211.8"	2,211.76
Williamsburg, 1.6 miles east of, on north edge of road, 40 feet west of bridge over Culverson Creek, 20 feet east of lane north through gate, on top of rock boulder; chiseled square, fence rail marked "T. B. M. 2,099"	2,098.96

Feet.

Williamsburg, in front step of **Williamsburg Bank;** bronze tablet stamped "W. Va.-1920-2,190"........ 2,190.117

Witness mark, 15.6 feet S. 8° E. on southeast corner of bank step; chiseled square........ 2,188.78

From Williamsburg north along highway to near Friars Hill (Lobelia Quadrangle.)

Williamsburg, in bank building; bronze tablet........ 2,190.117

Williamsburg, 1.0 mile north of, at forks of road, on west side of, in northeast corner of public scales, on top of rock boulder; chiseled square, post marked "T. B. M. 2,207.3"........ 2,207.27

Williamsburg, 2.0 miles north of, in northeast corner of forks of road east to Maysville, north to Friars Hill, on top of rock outcrop; chiseled square, rock cut "U. S. B. M." oak tree blazed and marked "T. B. M. 2,289"........ 2,288.91

Williamsburg, 2.5 miles north of, on east side of road, 60 feet north of gate, in top of rock ledge; bronze tablet stamped "H-6-1921-W. Va."........ 2,268.511

Witness mark, 34.5 feet N. 5° E., in west root of 15-inch jack oak tree; copper nail and washer........ 2,269.05

Note: B. M.'s omitted here are transferred to Lobelia Quadrangle.

From Friars Hill east along highways to Renick.

Renick, 2.6 miles northeast of, on east edge of road, 50 feet south of bridge, on top of rock ledge; chiseled square, rock marked "1,985.7 T. B. M."........ 1,985.85

Renick, 1.6 miles west of, 35 feet west by 35 feet north of road forks, on top of rock in pasture; chiseled square.... 2,019.52

Renick, 0.5 mile west of, known as **Falling Springs,** in forks of road, on top of rock boulder, chiseled square, telephone-pole marked "2,032.3"........ 2,032.10

Renick, in front door-step of bank building; bronze tablet stamped "W. Va.-1920 Elev. 1,901"........ 1,900.596

From Alvon west along highway to Anthony.

Alvon, 2.5 miles west of, at forks known as **Hull's Corners,** on south side of road, in north root of 12-inch pine tree; copper nail and washer........ 1,964.21

	Feet.
Alvon, 3.7 miles west of, 60 feet west of Rocky Run, on north side of road, in east root of 15-inch cedar tree; copper nail and washer, tree blazed and marked "1,946.2 T. B. M."	1,946.13
Alvon, 4.6 miles west of, 3.4 miles east of **Anthony**, on north side of road, at base of rock cliff, on top of ledge of rock; bronze tablet stamped "H-9-1921-W. Va.," ledge marked "U. S. P. B. M. 1,886.8"	1,886.748
Witness bench mark, 136.6 feet S. 75° W., in top of large boulder on south edge of road; chiseled square	1,888.92
Anthony, 2.3 miles east of, in forks of road, at point where main road starts to climb the mountain and old road follows creek, on north side of road, on top of large boulder; chiseled square, rock marked "U. S. T. B. M. 1,871.2"	1,871.19
Anthony, 1.4 miles east of, on south edge of road, in low gap, on top of rock ledge; chiseled square, ledge marked "T. B. M. 2,154.3"	2,154.29
Anthony, 60 feet northwest of station, 30 feet west of track, in base of telephone-pole; iron spike, painted "1,799.8"	1,799.30
Anthony, in front of telegraph window; top of nearest rail of main-line track	1,798.04

WINONA QUADRANGLE: GREENBRIER, FAYETTE, AND NICHOLAS COUNTIES.

(Latitude 38° 00′-38° 15′; Longitude 80° 45′-81° 00′)

From Fowler Knob along highways southwest to Russellville, thence southeast to Riverside (Meadow River.)

Millers Ferry (over Meadow River), 0.1 mile north of, east of river, west of road, in ledge of rock; aluminum bolt stamped "1905 Knwa"	1,905.917
Russellville, 90 feet north of, east of road, west of river, in ledge of rock; aluminum tablet stamped "1900 Knwa"	1,901.102
Riverside (at Meadow River), 150 feet northwest of, 800 feet east of ford, west of road, between house and barn, in one of several ledges of rock; aluminum bolt stamped "2324 Knwa"	2,325.219

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